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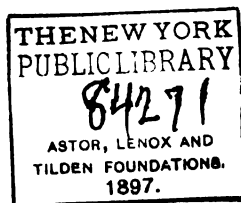
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## The Marine Engineer.

LONDON. APRIL 1, 1895.

THE disastrous collision between the North-German Liner *Elbe* and the screw-steamer *Crathie* of Aberdeen, has once more drawn forcible attention to several matters of the highest moment connected with the safety of ocean travel by large mail and passenger steamers. Questions bearing upon one or more points raised by the disaster have been asked in Parliament, letters and leaders have appeared in the daily press, and the public mind has been, as it always is in the face of appalling catastrophes, deeply stirred by sorrow and amazement mingled with aggrieved questioning. Things, however, are already settling into that quiescent state born of the rapidity of events, and the common human failing of easily forgetting disagreeable things. There are, however, lessons enforced by the disaster which those connected professionally with shipping cannot afford to overlook or leave unconsidered. More forcibly than in any previous instance of collision and resulting disaster, the case of the *Elbe* points to the subject of watertight sub-division of ships. It is considered one of the proudest—and it is certainly one of the best canvassed—qualifications of our large modern mail and passenger steamships, that they would not sink in the event of “any two compartments being opened to the sea.” We have always suspected that in the phrase just quoted—“any two compartments, &c.”—the machinery compartment has been left out of account. This is necessarily the space largest in capacity and lending itself least to sub-division. At most, all that can be done in this space is to divide the engine-room from the boiler-room by a bulkhead having large doors for inter-communication. In the case of twin sets of engines a central bulkhead may be fitted, but here again, doors are a necessity, and even advisable so as to obviate the weight of the sea—in the case of an inroad—heeling the vessel to one side dangerously. The condition of unsinkability, with the engine space and another compartment simultaneously laid open, was not maintained in the case of the *Elbe*, and what happened to her—viz., the opening of her shell in wake, of the bulkhead dividing the engine-room from the cargo compartment abaft it, the shattering of that bulkhead itself, and the consequent inrush of the sea to both compartments simultaneously—may happen to any of our large ocean liners to-morrow. Had the blow been delivered in wake of the bulkhead dividing the engine-room and boiler-room, the result might have been

equally disastrous, and perhaps even more appalling. But this is a point which the enquiry to be instituted about the catastrophe may be expected to make clear: whether the door in the bulkhead separating engine and boiler-rooms was closed or open, and whether, had there been no door at all in this bulkhead and the water had been kept out, the vessel would have floated. We think the time has come for all our large ocean passenger steamships to be fitted with watertight bulkheads not only in full conformity with the recommendations of the Bulkheads Committee, but that all so-called watertight bulkheads should be so more than in name, viz., that there should be no doors nor openings whatever. It may be thought by some to be quite impracticable in passenger steamers to avoid altogether in bulkheads watertight doors on the level of the lower decks. This is not so, however, and in the *Paris* and *New York*, built seven years ago, there has never been doors, the bulkhead running intact from the bottom of the ship to the upper deck. Any passenger, therefore, or for that matter any engineer or stoker, who wishes to go from one compartment to another, must go to the upper deck level. While one passenger out of 100 may grumble at the momentary inconvenience, the prospective advantage of the system in the event of a collision or other mishap is a most convincing argument in support of it. The *Paris*, four years ago, as everyone knows, met with a mishap in the engine-room, which led to its being speedily flooded, but as there was no door to the boiler compartment, the latter was kept free from water. The bulkhead aft of the engine-room was damaged, and the compartment abaft it flooded, but still the vessel floated. The abolition of doors is not impracticable in steamships, and their absence is found from experience in the case of the *Paris* and *New York* to cause no very great inconvenience. In spite of the many ingenious methods of promptly closing doors, panic and human error in critical emergencies are matters which come in to discount such efficiency. It would be better, therefore, to at once recognise the fact, and extend the system of dispensing with doors. The *Elbe* disaster has been made the occasion of some agitation both in and out of Parliament, to have the character of vessels as to bulkhead sub-division subject to Board of Trade jurisdiction. This, however, we think, is ill-advised, or at all events the giving effect to the aims of the agitation would be. We are of opinion that the responsibility of providing efficient sub-division should be allowed still to lie with owners themselves. Any regulations as to sub-division, which might be framed for general application would inevitably prove unfair and harassing in particular cases. Owners of cargo-carrying vessels especially would find the new powers



of the Board of Trade in this matter subject of serious complaint. On the other hand, with the onus and responsibility of providing efficient sub-division still resting with owners, matters in the case of passenger vessels will always adjust themselves. The lessons of the *Elbe* disaster, though costing dear, will be laid to heart, and improvements on the lines we have indicated may soon result. All that the Board of Trade may be looked to to accomplish is to encourage the introduction of efficient watertight compartments, in accordance with the recommendations of the Bulkheads Committee of 1891, by a partial exemption of vessels so fitted from the requirements of the Merchant Shipping (Life Saving Appliances) Act, 1838, to which it would otherwise be necessary to conform. This exemption, together with the prospect of State employment in times of war held out to vessels efficiently sub-divided, will be found inducements enough towards attaining the ideal of unsinkability; even if it were not the case that the sense of responsibility resting on owners and builders of large passenger steamers is in itself as potent as compulsory enactments might prove to be.

THE Admiralty is getting it hot again. Public offices in England are at present no sinecure. There seems always someone ready and willing to find fault. If things go easy and in the ordinary routine, the department is hauled over the coals for being inert and sluggish. If, in desperation, a department makes some unusual effort to be abreast of the times, it is denounced at once as rash and improvident. We trust that between such a Scylla and Charybdis the official mind preserves its equanimity under either fortune, as being all in the day's work. From our own point of view, seeing the great temptation there must be in an official department to run in well-known and safe grooves, even at the expense of energy and enterprise, we would welcome any movement towards marching with the progress of the day, even if such departure seemed at first experimental. Somebody must lead the way in innovations, and it is seldom that a Government department can lay any well-founded claim to enterprise in new inventions, but rather finishes up, without a "place," when everybody else has done the up-hill work for them. These remarks are apropos of the serious wiggling in Parliament that the Admiralty have lately undergone through adopting water-tube boilers rather extensively for some new ironclads. Perhaps the rancour of the critics has been most severely stirred by the fact that the favoured water-tube boiler, viz., the Belleville, bears a foreign name, and has its first origination from our neighbour France. As the boilers in ques-

tion, however, are produced by the Admiralty themselves, and also by Messrs. Maudslay, Sons & Field, so well known for the quality and reliability of their workmanship, we think that these facts should do much to cover the foreign origin and appellation of the boilers. We have no doubt that the selection of these boilers by the Admiralty has been guided by the fact that they are the only water-tube boilers for heavy marine purposes that have any established record to show. We have no doubt that in a few years many of the water-tube boilers now being built in this country from English designs, and so to speak out of our own heads, will have a record sufficiently good to qualify them for adaptation to any sea-going steamer, cruiser or ironclad. But British prejudices die hard, particularly where those prejudices are based upon vested interest in capital sunk in plant and factories, organised to produce established and recognised productions. An improvement, however, if it really is one, and will stand the test of wear and tear, will sooner or later make its way, and even force the ejection of obsolete ideas out of the window, and Canute was as reasonable in commanding the tide to cease to flow, as are those who would endeavour to prevent the adoption of innovations if those innovations have real merit to recommend them. We believe with many engineers and experts and ship-owners, such as Messrs. Wilson & Sons, that water-tube boilers have a future before them. They are essentially, in principle, the lightest type of boiler for the most speedy evaporation, and need not necessarily, that we can see, be either less economical, or less safe and reliable, than their unwieldy progenitors. It is quite probable that we shall not at once produce the most effective and most reliable type of such a boiler, and that we shall learn from many mistakes and errors, by dire experience, as to the best form ultimately for safety and reliability, but this is the characteristic of all new departures in the engineering world, and success can only be attained to the full by the aid of actual experience and lengthy test. Mr. Allan's cry against the Admiralty is too bitter to be effective, and was unfortunately based upon general statements which, when analysed, do not seem to have been sufficiently warranted by facts. Mr. Charles H. Wilson speaks emphatically of two years' satisfactory experience with water-tube boilers made by Messrs. Babcock & Wilcox, and expresses his definite opinion that after further satisfactory confirmatory trials, his firm will abandon the use of cylindrical boilers. This, as coming from a source which has no interest in any type of boiler beyond that of obtaining the best value for their money, is pregnant testimony indeed as to the probable future of water-tube boilers. On the other hand, those

makers of cylindrical boilers who are anxious of course that such boilers should have their full modicum of praise and credit, can and do adduce marvellous performances of these boilers under the latest improved conditions of heat-catching flues and artificially-induced draught. There is no doubt that the competition of the water-tube boilers will cause the makers of cylindrical boilers to minutely watch all details of their construction and means for the increase of their evaporation by artificial draught, so that they will run their rivals very close, and the shipping trade and the world at large will be all the better for the very keen antagonism that at present rages between the diverse forms of construction. Messrs. Thornycroft and Yarrow & Co. are anxious

#### HARDING'S PATENT TACHOMETER.

IT is somewhat refreshing in these days, when so much is heard of foreign competition and the importation of foreign manufactured goods, to hear of instances in which a hitherto foreign-made device has been taken in hand by a home firm, who have made up their mind to put on the market a thoroughly efficient home-manufactured article, which will compete in every way with the foreign-made goods. It has always been a matter of surprise that, hitherto, the only tachometers or speed indicators conforming with the requirements of modern marine engineering, have been almost entirely of foreign make, and many shipbuilders, engineers and electricians have regretted that they have been obliged to use expensive and sometimes unreliable instruments that were of foreign manufacture.



that the world should know, that though they may have no considerable records as yet for their light water-tube boilers in vessels of large tonnage, yet that they are not to be considered in the experimental stage, but to have already obtained a sufficient record of success and reliability to warrant the adoption of their types of boilers to any H.P. if the shipowners or the Admiralty have the pluck to do it.

**Chasseloup-Laubat.**—The French second-class protected cruiser *Chasseloup-Laubat*, 3,740 tons, launched in 1893, has lately completed her full-power trial. The engines developed 9,700 H.P., and with 128 revolutions she made 18.5 knots. Her estimated speed for 9,000 H.P. was 19.25. The boilers are on the Lagrafel-d'Allest system.

We have the pleasure now, however, in placing before our readers an illustration of a new tachometer, which has been put upon the market by Messrs. T. R. Harding & Son, Limited, Leeds. This instrument, we understand, has been designed to comply with the latest Admiralty requirements, and with a view of not only being made, so as to be more accurate and reliable than the foreign-made instrument, but at the same time, by reason of its extreme simplicity of construction, it can be sold at a considerably lower price. We understand that large numbers of these instruments have already been supplied for ships ordered by the Admiralty, either direct to the Admiralty or through the shipbuilders. An important feature that Messrs. Harding & Son, Limited, make, is the supplying, when desired, with the tachometer of a special driving gear, enabling the instrument to be driven

direct by means of vertical shafts from the shaft of the main engines. The latest type of this gear, specially designed for the new torpedo-boat destroyers, includes a Harding revolution counter driven by the vertical shafts that drive the tachometer, so that the shipbuilders can order from one firm the tachometers, revolution counters, and direct driving gear all self-contained, thus saving a considerable amount of detail work, properly belonging to the makers of the instruments.

It will be seen from the illustration, that the Harding tachometer is a neatly designed and compactly made instrument, and it may be well to add that these instruments can be driven from any direction and from any size of pulley or shaft, and also that the dial can be marked for any range of speeds, or placed on either side of the pedestal.

We should judge that an instrument having the above-mentioned characteristics should prove a formidable rival to foreign-made instruments. Messrs. T. R. Harding & Son, Limited, of Tower Works, Leeds, are the sole makers of the instrument.

## THE INSTITUTION OF CIVIL ENGINEERS.

AT the Ordinary Meeting on Tuesday, March 12th, 1895, Sir Douglas Fox, Vice-President, in the chair, the first paper read was on "The Kidderpur Docks, Calcutta," by Mr. W. Duff Bruce, M.Inst.C.E.

Within the limits of the Port of Calcutta the river Hooghly varied in width from 1,800 to 2,000 ft. From March to July, when strong winds prevailed, the current at spring tides attained a velocity of from 5 to 6 miles an hour, and during the rainy season the water carried a large quantity of mud in suspension. The city was about 90 miles from the sea, and the tidal range between low water of spring tides in the dry season, and the average high water in the rainy season was about 18 ft., and during floods as much as 22½ ft.

Previous to the construction of the docks the trade of the port was carried on at a wharf constructed of iron piles, extending for a length of 3,000 ft. along the river bank. The wharf was equipped with hydraulic cranes and provided with sheds having a total area of 250,000 square ft. Further accommodation being required, and space not being available for extending the wharf, it was decided to construct docks at Kidderpur, the nearest point to the mercantile part of the city at which land could be obtained at reasonable cost. The docks so built consisted of a 60 ft. lock and an 80 ft. entrance from the river to a basin 600 ft. by 680 ft., with a double entrance of 60 ft. and 80 ft. leading from the basin into a dock 2,600 ft. long and 600 ft. wide for the greater part of its length, the area of the dock being 3¼ acres. Two graving-docks, one 520 ft. and the other 350 ft. long, had also been made on the east side of the basin. An important feature of the design was the construction of a canal and boat-dock from Tolly's Nullah to the southern end of the docks for the supply of clear water. Water was admitted from the nullah to the canal, which was 3,300 yds. in length, at high tide, and was allowed to flow into the canal until its level attained that of high water. The sluices were then closed, and the flow of the water through the canal being very slow, the mud which it contained on entering the sluices was deposited before reaching the pumping-station. There the water was raised by centrifugal pumps to a maximum height of 11 ft., and discharged into a canal connected to the south end of the lock. The object of this arrangement was to prevent the inflow, through the entrances, of water highly charged with mud, to ensure the frequent change of water in the docks, and to allow of the foundations of the walls being kept as high as possible. The pumps provided were capable of raising 256,000 cubic feet of water per hour through a height of 10 ft., and were worked as required to maintain a higher level of water in the dock than in the river.

The docks were equipped with fifty-six movable hydraulic cranes, fifty being constructed to lift 35 cwt., and six to lift loads up to 5 tons. All these cranes had a radius of 36 ft. and overhung the quay 29 ft. Pressure for working the cranes, lock-gates, capstans, and swing-bridges was provided by hydraulic engines situated near the south end of the docks. The engines (two pairs) were each of 230 I.H.P. The pressure in the mains was 700 lbs. per square inch. In addition to the cranes, sheers, worked by steam power and capable of lifting 100 tons, had been erected on the east wall of the dock.

Cargo sheds, 300 ft. long and 120 ft. wide, had been erected on both sides of the dock, the total shed-area provided being 432,000 square feet. About 28 miles of railway lines had been laid to the 5 ft. 6 in. gauge, for working the traffic of the docks. The quays and sheds were lighted by arc and glow-lamps.

The dock and basin-walls, the design of which led to much discussion, were 35 ft. wide at the base. They were built with voids filled up with broken bricks and dry earth, and had a subway near the top for the accommodation of hydraulic and other mains. The walls were of sufficient width at the top to entirely carry the cranes. Owing to the treacherous nature of the ground, it was found impossible to excavate trenches for the full width of the walls; the ground was therefore only taken out for half the width at one time, and when the brickwork was built in the excavated portion up to the level of the dock bottom, the second half of the trench was opened and the wall was then completed to its full width. The author intended that the walls should have a berm of earth left in front, and should not be backed up higher than the top of this berm until water was admitted into the dock, when the berm would be dredged away and the backing completed. This method of construction was adhered to until the works were almost finished, and when the author visited them in February, 1890, the walls were completed and the backing in this condition. Subsequently, however, the backing was filled in to within 2 ft. to 4 in. of the coping level, and in October, 1890, before the dock had been fully excavated, a movement in parts of the walls took place, an account of which was given in the second paper, by Mr. J. H. Apjohn, the engineer then in charge of the works in India. The damaged portions of the walls had since been repaired and the docks opened for traffic.

In the second paper, "Note on the Movement of the Walls of the Kidderpur Docks," by Mr. J. H. Apjohn, M.A., M.Inst.C.E., an account was given of movements which had taken place early in October, 1890, in the eastern and south-western walls of Dock No. 1. These were first indicated by cracks in the walls of cargo-sheds then in course of construction, and afterwards by considerable advances of the coping-lines.

A plan of the dock was given, showing that the length along which the movement occurred in the eastern wall was 2,080 ft., and the amount by which the coping-line had advanced at the point of maximum displacement about 7½ ft. A length of 450 ft. of the south-western wall was effected, but the advance of the coping-line was in this case about twice the amount observed in the eastern wall. The positions and dimensions of the cracks at the coping level in the south-western wall were indicated in a large-scale plan, and cross-sections at various points along the lengths of the walls illustrated their original positions and those assumed after the movements had taken place.

The stability of the walls, after water had been admitted to the dock, was considered, the results of the forces concerned being laid down upon diagrammatic cross-sections. The admission of water to the docks had entirely obviated danger from further movement of the walls, so that no attempt had been made to strengthen them.

The paper concluded with a short description of the repairs carried out upon the walls, of which the coping lines had been straightened and a portion, near the north-east shoulder, converted into landing-steps.

Messrs. Mavor & Coulson.—Mr. Carrington Smythe, of 12, Idol Lane, E.C., has been appointed sole agent for London and district for Messrs. Mavor & Coulson, engineers and electricians, Glasgow, and will represent them for the sale of their manufactures, including Sayer's patent dynamos and motors, "C.O." concentric system, also for the equipment of complete lighting and power installation, electric traction, heating and welding, and electric launches. Special estimates and prices on application.

**THE NORTH SANDS YARD, SUNDERLAND.**

WITH a view to increasing the length of the building berths, so as to be able to put down vessels up to 500 ft. in length, Messrs. J. L. Thompson & Sons, the eminent Sunderland ship-builders have decided to remove their joinery department from the North Sands Shipyard to the Manor's Quay Repairing Works where they fit out vessels after launching. For the purposes of the change, the firm have erected at the latter place a substantial building 200 ft. long by 60 ft. in width. The ground floor is used for carrying out the preparatory operations connected with the fitting of timber to its manifold uses on shipboard. On this floor is placed the more powerful machinery, including a horizontal saw capable of cutting through a huge piece of timber at the rate of 6 ft. per minute. The main entrance is, as a matter of course, on this floor, from the centre of which a wide staircase leads to the upper floors. The first floor is fitted from end to end with work benches, and a variety of machines for planing, moulding, mortising, tenoning, &c., as well as band, and cross-cutting saws. These are all of modern type, and without doubt, the most effective procurable. The upper floor is somewhat narrower than those below it, but is of equal length. At one end is a commodious polishing or varnishing room, where some dozen operatives will have ample space for carrying on this interesting branch of work, which amounts almost to an art. Owing to the special nature of the work to be done in this department, great pains have been taken to keep it free from dust accumulations while, at the same time, maintaining adequate ventilation. The ventilating and sanitary arrangements throughout the whole of the building are, indeed, exceptionally good, and evince much consideration for the health and comfort of the workers. The machinery in the building is driven by a 30 H.P. gas engine; but a hydraulic lift will be provided for conveying material from the basement to the first and second floors, or finished work from the upper floors to the lower. This, of course, will involve a very considerable saving of labour—a result which will be further helped by the contiguity of the new premises to the mooring place where all the vessels built by the firm, as well as those they have to repair, are finally fitted out. With a view to seasoning and drying timber, a gallery has been run along the front of the building on the level of the first floor and a hot-air stove has been provided in the interior to supplement the drying and seasoning facilities afforded by the outside gallery. Nothing, indeed, seems to have been omitted which could make the building—as a joinery department—complete in every detail; and it is certain that the possession of such facilities for dealing with the finer class of work which they have now at their command, will materially help the firm in their efforts to bring to the port more of that kind of work than has hitherto fallen to its share. The elaborateness and completeness of the arrangements made for turning out work, show that the firm intend making the construction of passenger steamers more than ever a principal feature of their business, and we are pleased to note that almost the very first work that is being done in the building is intended for a vessel of this description. In this vessel there is quite an exceptional amount of joiner work; but it is being dealt with very easily, the output capacity having been increased three-fold by the new arrangements. An electric lighting installation has been fitted by the well-known firm, Messrs. Ernest Scott & Mountain, Limited, of the Close Works, Newcastle. The plant consists of a "Tyne" compound wound dynamo of Scott & Mountain's improved type, capable of giving an output of 400 amperes at an E.M.F. of 65 volts when running at a speed of approximately 600 revolutions per minute. The machine is fitted with an extended bedplate with outer bearing and a very heavy fly wheel, so that an absolutely steady light is obtained when driven by a gas engine, but at the present time the dynamo is driven by the existing steam engine which drives the bending rolls and other machinery in the ship repairing yard. The current from the dynamo is taken to a main switchboard, and is from there divided into three circuits, one circuit being taken overhead to the joiners' shop, another circuit along the jetty for driving cluster lights for repairing oil ships, &c., and also for working electric deck planers and drilling machines, and the third circuit is provided as a spare, as the firm contemplate applying electricity to many other purposes besides lighting. In the joiners' shop a distributing switchboard is placed on the first floor, and from this board eighteen arc lamps of 2,000 candle power each are fed, the lamps being on separate circuits so that

any lamp can be switched on or off as required. The arc lamps are of Scott & Mountain's improved type, being exceedingly simple, and are fitted with light flashed oval globes with solid bottoms, so that it is impossible for any sparks or pieces of carbon to fall. This is an extremely important matter in a joiners' shop where shavings are lying about, and these lamps particularly meet the requirements of the case. The varnishing shop and light joiners' shop are lighted with incandescent lamps of 16-candle power, there being in all between 40 and 50 incandescent lamps. Along each side of the first floor and ground floor a separate circuit is laid with wall plugs about every 10 ft., portable hand lamps being provided, so that the shafting or under side of any of the wood-working machines can be quickly examined. The installation has been carried out with the greatest care and is probably one of the most complete in any joiners' shop in the kingdom.

**THE SENTINEL PATENT HORIZONTAL STEAM STEERING GEAR.**

THE Sentinel Works of Messrs. Alley & Maclellan at Polmadie, Glasgow, noted for the large number and high-class character of engineering specialities they produce, have long been well-known in shipping and marine engineering circles for their make of "Sentinel" steering gears. About 1,000 vessels in all have been supplied with steering gears by this firm, and this, as a measure of the success attained in the past, bids fair to be quite eclipsed by the reception being accorded to a new gear differing essentially in principle from the type of Sentinel gear formerly made. The gear in question, "The Sentinel Patent Horizontal Steam Steering Gear," is not new in the sense of being untried in practice, as already between 15 and 20 gears are at work on steamships.

On pages 6 and 7 we give illustrations of the gear, from which it may at once be gathered that its distinguishing feature, and a distinct novelty in ship steering gear generally, is that not only are the cylinders and their working parts placed horizontally, but the worm wheel and chain pulleys work also in a horizontal position, thus saving the first and hardest nip in the lead of the rudder chain which must necessarily occur in altering—in the case of an ordinary fore and aft barrel—from a vertical lead to a horizontal one, leading athwartships. This arrangement allows the drum, which is large enough to take up all the chain in one revolution, to be placed quite close to the deck, and the chain may be led away direct to the ship's side without the intervention of the guide pulleys and quick bends which absorb so much power in the ordinary type of steering engine with chain barrels on horizontal shafting. In the "Sentinel" horizontal gear the few pulleys required are of extra large diameter, thus rendering the travel and stress of the chains very easy.

The engine of this gear has two cylinders, placed horizontal, with the Sentinel Patent Slide Reversing Valves worked by one eccentric, the casing doors being at outside of cylinders for easy access to the valve and having an automatic controlling valve of the piston type placed between the cylinders for easy reversing. The main framing which carries the engine part of the gear is bolted on to the top circular flange of the base part, which carries the chain pulleys, and for examination of the latter, at any time, it can be easily lifted and lowered into its place

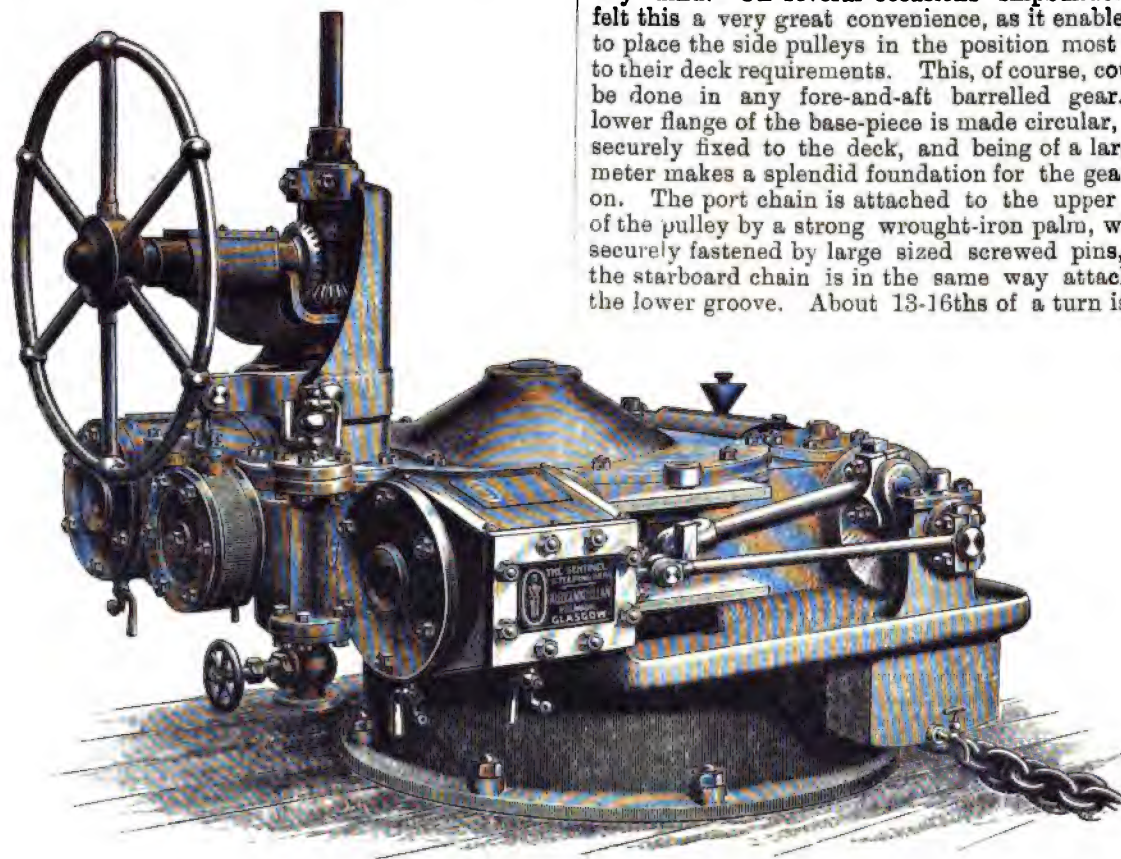


again without dismantling a single part of the gear. The main bearings in which the crank shaft works are of great length, and have adjustable gun-metal bushes for taking up the wear. The crank shaft is of mild steel, and has the worm cut out of the solid in one with the shaft. The worm-wheel into which the worm works is of a special mixture of iron, and has extra broad and deep teeth so as to give great surface. Both the worm and worm-wheel run in a bath of oil and water, which cannot leak, and in this way perfect lubrication is ensured.

The vertical spindle on which the worm-wheel is carried is of mild steel of an extra large diam. This spindle has a long bearing both above the worm-wheel and below it, and on the end of this spindle is a pinion

the chain pulleys round until the palms are brought opposite the openings in base-piece, for taking off and on the chains for examination at any time, this being effected by revolving the clutch, which has podger holes bored in it for this purpose. The chain pulleys are of an extra large diam., the centre bearing is bushed with gun-metal, and revolves round a vertical steel spindle with perfect smoothness. The spindle has suitable bearings, both above and below the pulleys, and is lubricated automatically from the inside bath in which the worm-wheels revolve.

An important point about the horizontal position in which the chain pulleys revolve is the fact that the chains can be led away to the sides of the vessel at any angle desired without requiring guide pulleys of any kind. On several occasions shipbuilders have felt this a very great convenience, as it enables them to place the side pulleys in the position most suited to their deck requirements. This, of course, could not be done in any fore-and-aft barrelled gear. The lower flange of the base-piece is made circular, and is securely fixed to the deck, and being of a large diameter makes a splendid foundation for the gear to sit on. The port chain is attached to the upper groove of the pulley by a strong wrought-iron palm, which is securely fastened by large sized screwed pins, while the starboard chain is in the same way attached to the lower groove. About 13-16ths of a turn is suffi-



cut out of the solid in one with the shaft. The pinion works into an internal toothed wheel which is cast inside of the chain pulleys. This, to a great extent, takes the strain off the teeth of the worm-wheel so that it runs for years without being marked. The worm-wheel is not keyed to the vertical shaft, but has a clutch box cast on the upper portion of it to receive the clutch, which slides up and down on two broad steel feathers securely fitted to the shaft. This clutch serves two purposes; first, in the case of any emergency, the clutch can be lifted out of the worm-wheel in a few seconds, thus freeing the engine from the chain pulleys, so that the chains need not be removed when steering the vessel by the screw gear aft; the second purpose which this arrangement serves is in bringing

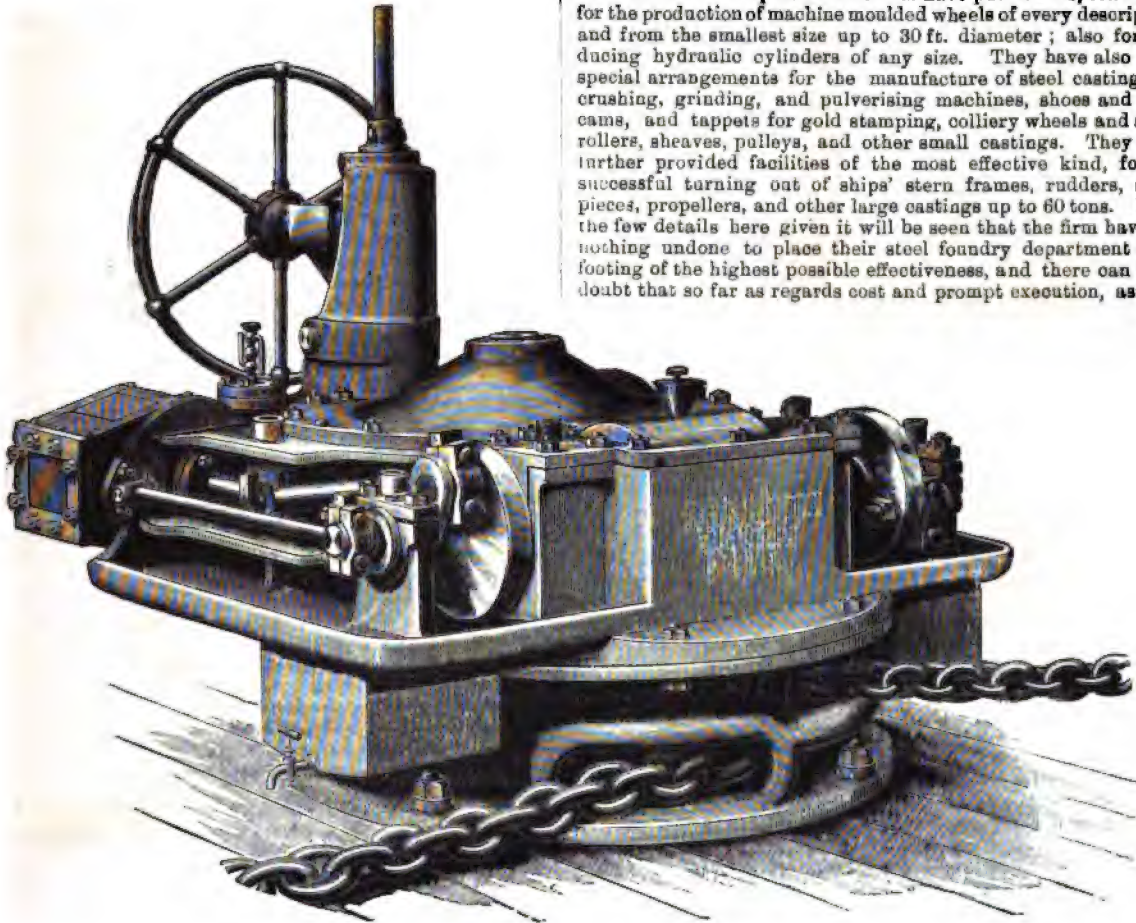
cient to bring the rudder from hard-over to hard-over, and the one chain is separated from the other by a strong central flange on the pulleys, and is also shielded by the circular body of the base-piece, so that it is absolutely impossible for one chain to foul the other in any way whatever. The large diameter of the pulleys makes it very easy on the chains, and the smoothness with which the pulley revolves makes it also easy on the working parts of the gear.

Another very important feature about the Sentinel Horizontal Gear is the fact that the engine part of the gear can be placed on the top deck, while the base-part, which carries the pulleys, can be placed on a lower level, and made to revolve by a strong vertical shaft worked by the engine. This arrangement saves



three hard nips on each side where it is necessary to carry the chain over the house and down the sides. In fact, the Sentinel Gear chain-pulleys can be laid down on the deck which is level with the chains leading aft, while the engine part may be placed up on a higher level when found to be more convenient. The gear can be arranged to work direct on the rudder-head with the Sentinel Patent Spring Quadrant. It can also be combined with hand power, but the makers prefer making it steam only for vessels over 1,500 tons gross.

A large number of vessels have now been fitted with this new gear, ranging from 500 to 4,000 tons gross, and giving the greatest satisfaction. Nine have been



fitted with great success to Messrs Wm. Doxford & Sons' turret type of cargo vessels which are coming into favour so rapidly. The gears are worked with steam, carried direct from the main boiler at 160 lbs. pressure. The owners of several vessels already fitted with the gear speak very highly of its sweet working and the great saving on the chains and all the working parts, and at the present time Messrs. Alley & Maclellan have a large number in hand.

The "James Forrest" Lecture at the Institution of Civil Engineers on Thursday, the 2nd of May next, is to be by Professor W. C. Unwin, F.A.S., M.Inst.C.E., and is intended to be a complete monograph on the History of the Experimental Study of Heat Engines.

### THE CYCLOPS WORKS, SHEFFIELD.

Messrs. CHARLES CAMMELL & CO., of the Cyclops Steel and Iron Works, Sheffield, have for some time past been engaged on extending and re-organising their steel founding department, with a view to meet more completely the requirements of customers. It need scarcely be said that a firm of such standing, when making a change, have not been deterred by considerations of cost from investing the new arrangements with every requisite calculated to facilitate production and enhance their world-wide reputation. The re-equipment of this important department has indeed been carried out on a scale of great completeness; the additional machinery put down being by the best makers and the most effective procurable at the present day. The firm are accordingly in a position to supply steel castings for marine and bridge work, locomotive, electrical, mining, hydraulic, agricultural, and other machinery, with the utmost dispatch. The firm have put down special plant for the production of machine moulded wheels of every description, and from the smallest size up to 30 ft. diameter; also for producing hydraulic cylinders of any size. They have also made special arrangements for the manufacture of steel castings, for crushing, grinding, and pulverising machines, shoes and dies, cams, and tappets for gold stamping, colliery wheels and axles, rollers, sheaves, pulleys, and other small castings. They have further provided facilities of the most effective kind, for the successful turning out of ships' stern frames, rudders, stem-pieces, propellers, and other large castings up to 60 tons. From the few details here given it will be seen that the firm have left nothing undone to place their steel foundry department on a footing of the highest possible effectiveness, and there can be no doubt that so far as regards cost and prompt execution, as well

as in the more important feature of quality, the firm will be able to hold their own against the world in this, as in the other departments of productive work in which they are engaged.

**Torpedo Boat "Kodaka."**—The following account of the capture of Port Arthur, written by a Japanese officer, has been received:—"The armour-plated Yarrow torpedo boat *Kodaka* is now in China waters on active service, and proving to be of great use. It was she that led the torpedo flotilla in their daring entry into the harbour of Port Arthur at the nick of time, which called forth the admiration of the British officers on board the *Porpoise*. She is at this moment being used for scouting purposes off Wei-Hai-Wei. Meanwhile, I may say that none of the Chinese torpedo boats have given a creditable account of themselves, and a flotilla of these craft was conspicuous by its flight very soon after it met our fleet. Since writing the above, the *Kodaka* took a leading part in the successful attack at Wei-Hai-Wei."



## THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

### A Long Passage.

LAST month I began my notes with a tale of disaster. This time I can begin them with a tale of escapes. There were some wonderful arrivals just at the end of February of vessels whose case was, at least from an underwriter's point of view, almost hopeless. First, there was the *Istrian*, once a liner in the Leyland fleet. She left Liverpool for Newport News as long ago as the 24th January. Anxiety about her began to be evinced about the middle of February, and on the 25th re-insurances were being effected in respect of her at as high a rate as 80 to 85 guineas. She, however, reached Bermuda in safety that day about of coal. She, of course, had the brunt of the bad weather but pulled through all right. She is a proof, if a proof were needed to-day, of the fact that well-built iron steamers last practically for ever. She was launched as long ago as the year 1867, being one of the earlier productions of the famous yard of Messrs. Harland & Wolff. She was fitted with an iron deck which eight-and-twenty years ago was not so common a device as at present. Then too, the *Loch Maree*, whose adventures were alluded to last month, went to about as high a premium as tug after tug came back to the Irish ports for fresh supplies of fuel and made the discouraging report that nothing was to be seen of the derelict. It was a very agreeable surprise, therefore, when, on the last day of February, the news came that she was picked up and coming into Belfast Harbour in tow and under her own steam. The lucky finder of this valuable prize was the *William Joliffe*, a very powerful Liverpool tug.

As the *Loch Maree* was abandoned on the 10th, she had been adrift more than a fortnight, but as far as was reported, she seemed very little the worse for the experience.

Then again, there was the experience of the *Ganges*, a vessel with a cargo as valuable as that of the *Loch Maree*. She had lost her propeller and made a port. Thence she was being towed home for repairs by a powerful tug when they encountered the February hurricane in the Bay of Biscay. The tow ropes parted and at last the tug was compelled to leave her helpless charge and go for fresh supplies of coal. The plight of those on board the *Ganges* left in an unmanageable ship in such weather was not a very enviable one. The officers and crew of the *Ganges*, however, were in this position for fully five days, and at last were sighted by the steamship *Sargasso*, bound from Norfolk to London. Not without difficulty was the help afforded, but at length all was overcome, and Captain Hynd brought his valuable prize safely into Queenstown after a tow of 150 miles.

### Captains.

I am very pleased to see that the latest, and one of the finest, additions to the fine fleet of the Pacific Steam Navigation Co.—the *Orpesa*—which sailed from Liverpool on her maiden trip on the last day of February, 1895, made her *début* under the charge of that fine and tried sailor Captain Massey. His present position reflects honour alike on himself and on the management he serves. He it was who six years ago commanded one of the finest steamers of the line—though not one of the most modern—when she struck an uncharted and utterly unsuspected rock in the Straits of Magellan. Eight minutes later his ship made her final plunge into almost unfathomable depths. Yet in that brief period, thanks to the discipline and courage of Captain Massey, 100 passengers and 98 crew were safely transferred to the boats. Not a life was lost and Captain Massey, who was the last to leave, escaped just as his charge sank. Do not let it be thought that I draw any comparison between this case and more recent and more disastrous ones. The accident happened in daylight, the sea was not rough, the ropes were not frozen, most of the passengers were on deck, for they had been at sea long enough to be enjoying the trip. Yet eight minutes is a very brief time, and it would have been strange if even a Court of Inquiry could have refrained from giving the captain the praise he deserved and the court bestowed. Captain Massey's employers did not hesitate to give him a new ship, and they did not only wisely but honourably. I doubt if the companies who make it an unalterable rule that the captain who loses a ship is dismissed the service, whatever may be the circumstances under which the casualty takes place, attain the object they have in view. That object is undoubtedly the prevention of accident. But the rule is not a just one. It tends to keep the best men out of the

service, for the man to whom every service is open will hesitate to put himself in a position where his whole career may be blighted by a matter which is entirely beyond his control or that of any of his subordinates.

Captain Massey now commands a very fine ship. She is a steel twin-screw schooner-rigged vessel of 2,817 tons net and 5,817 tons gross, built and engined by Messrs. Harland & Wolff, of Belfast. She did about 15 knots on her trial with about 3,600 I.H.P., and has all the improvements which the combined experience of her owners and builders can suggest. Good luck to the ship and the tried and resourceful man who commands her.

To turn to a sadder subject, I have to notice the fact that Captain Darby, of the s.s. *Ormu*, has died at the post of duty like so many other merchant captains. It is undoubtedly a very fine thing to be the commander of a first-class mail steamer. But the responsibility seems to be a crushing one. Men who have to be on duty for some eight-and-forty hours almost at a stretch, and that in the severest weather, like Captain Cameron—of whom I shall speak in a moment,—must find such hardships tell on their constitutions. And so we can hardly be surprised when we hear of mail captains dying suddenly at sea. The names of half-a-dozen distinguished sailors, who have died almost on the bridge, will readily occur to many of my readers. And now comes Captain Darby's untimely end. He died on the 18th of February when his vessel was crossing from Port Said to Naples on her homeward run and his remains were claimed by the sea on whose waters he had spent his life.

A certain weekly journal has awarded a prize to Captain Samuel Brooks, late of the s.s. *Arizona*, because he has traversed the greatest number of miles at sea of any person who went in for their "competition." Captain Brooks can boast that he has traversed some two and a-half million miles in sail and steam. He has been forty-eight years compiling this enormous total. But he was nine years in sail, and he was not therefore making the best use of his time then for getting over the ground, though, doubtless, he was learning the seamanship which stood him in good stead in after years. I should very much like to know who were the other competitors, for I should imagine that some of the retired Cunard captains, or even Commodore Hains could show quite as big a score if they were induced to reckon up what they had done.

Captain Dutton, of the Cunard steamer *Umbria*, has had a very unpleasant experience. According to a *Dailist* account of the March outward voyage of his steamer there were two large tidal waves shipped in calm weather on the afternoon of the 6th, as the vessel was steaming westwards some fourteen hundred miles from the Irish coast. The captain was resting in his berth and was roused by the unceremonious entrance of a large body of water, which completely wrecked his room and retired with the greater part of his personal effects. If the account be not exaggerated he seems to have had a very providential escape from being carried overboard or killed by the wreckage. The vessel herself was, of course, practically uninjured and made a passage of little over the average duration.

### A very Singular Statement.

Under the heading "A Singular Statement," the *Journal of Commerce* told us on the 8th March that owing to "unfinished workmen" the *New York* has since her last overhaul at Newport News lost no less than 2½ knots per hour, though her revolutions had increased three per minute. We have heard a great deal about the American workman and how his product in the *S. Louis* and the *S. Paul* is going to make the *Lucania* and all the other masterpieces of the British marine engine and shipbuilder look very small indeed. We have wondered how he was going to do it, seeing that he has had no experience in building fast mail boats. Now the mystery is solved. It is his personal want of finish which enables him to do all this. This quality seems to have already enabled him to do the impossible, for he has increased the revolutions slightly and largely diminished the speed, and that apparently without altering the propellers. A further explanation will be very welcome.

### The History of the Cunard Line.

My attention has been called during the month of March to a correspondence which took place in January in the columns of the *Glasgow Herald*. It commenced with an enquiry in a letter as to whether the famous line ever had a screw steamer called the *Persia* as well as the paddle steamer *Persia*, which made that

name a household word on both sides of the Atlantic. To that enquiry a very brief answer might have been returned. They never had a screw steamship of that name. And it might have been added that it has been the custom of this line never to use the same name twice. Famous as many of their ships have been their memories have always been allowed to disappear from the company's fleet lists and have never been put on again. This Cunard custom is a peculiarity of its own. The P. & O., the Pacific Steam Navigation Co., the West India Royal Mail and most of the historical companies have always desired to have such names as *Himalaya* and *Australia*, *Iberia* and *Patagonia*, *Trent* and *Nile* in their sailing lists. But the gentleman who answered the inquiry about the *Persia*, having correctly stated that there was no screw vessel of that name, volunteered the information that the *China* was their first screw steamer. This caused a very considerable correspondence and a great citing of authorities, from Wyman's Commercial Encyclopædia down to Maginnis's Atlantic Ferry. The fact of the matter is that the statement would have been correct if it had run—"the *China* was the first screw steamer built by Cunard's for the Atlantic Mail Service." This was in 1862. Previous to that time they had been running in the mail service a screw steamer called the *Australasian*, which they had purchased from a very unfortunate concern. With them, however, her luck changed, and as a telegraph steamer she is alive to this day, having, at various times, done very good service in transport work for the British Government since she ceased to sail under the rampant lion of Cunard's. This was the first steamer regularly employed by Cunard's in the mail service. But she even was not their first screw. The quotation made by Mr. Chalmers from Mr. Maginnis's book would appear adverse to this statement of mine. Mr. Maginnis's remarks ran, "Each was built of wood of improved designs, as experience pointed out, but with no radical departure from the *Britannia* until the year 1856, when the *Persia*, the first iron steamer owned by this line, was put upon the station to maintain the supremacy which was now being contested by other lines." The impression conveyed by this statement of Mr. Maginnis is strengthened by a remark at page 177 of his interesting book, where he writes, "The first Transatlantic Cunard screw steamer, *China*." But both these statements of Mr. Maginnis are too wide. The *Persia* was truly the first mail steamer built of iron for the line, but there had previously been several Transatlantic screws built for the same owners. In proof of this fact I have only to call attention to page 176 of Mr. Maginnis's own book, where he actually gives illustrations of "the engines of the Cunard steamer *Etna*, built in 1855"—the year before the *Persia* was launched. And even she was not the first.

#### Liverpool Improvements.

The first Saturday in March saw the practical inauguration of the second of the long-delayed improvements at Liverpool. The first of these was the provision of free transit across Liverpool for passengers and baggage. Dredging at the bar has now attained such a point that it is now possible for the Liverpool lines to make a fixed hour of departure. Unlike the Southampton lines they are bound by their contract with Her Majesty's Post Office not to leave Queenstown till the arrival of the mails at that port, which is soon after noon of the day following their departure from the Mersey. They are therefore sure either to have to go down channel slowly or to wait several hours at Queenstown if they leave Liverpool too early in the day. Thus it has been determined that the specials in connection with these steamers shall leave Euston at noon on the day of sailing. This is a very convenient time. For it gives passengers from the suburbs or from towns beyond London ample time to get there without making a start in the small hours. On Saturday, the 2nd March, the *Umbria* was the Cunarder appointed to sail for New York. The London passengers left Euston at noon, and four hours and thirty-two minutes later the railway authorities had transported passengers and effects, not only to Lime Street station, but to the landing stage and the tender. All payments, attention and responsibility for baggage are now removed from the shoulders of the passenger to those of the authorities, and the traveller having strolled on to the tender is carried off to his floating hotel where he has just time to inspect his stateroom and have a look round before dinner is served. Meanwhile the work of effacing the necessity of omnibuses—even if free—and of tender, is being rapidly pushed forward, and I expect that for the present, each month I shall have to record fresh conveniences provided by the White Star and Cunard Co.'s for the travellers who

sail under the blue ensign, which still has the monopoly of the passenger traffic from the Mersey to the Hudson. Next month, for example, there will probably be a large cut from the wait at Queenstown.

The Dock Board seem to have been really benefited by the various shocks they have received lately, and they actually would appear to have some idea at last of suiting their wares to their customers' needs. Thus it is announced that a wool warehouse is to be built near Great Howard Street with every convenience not only for storage but also for the transaction of business in regard to wool. Then again, the big graving dock projected at the Huskisson extension is to be even bigger than was proposed. It was, and so far, is, to have a width of 90 ft., but the original idea of a length of 750 ft. has been extended to 810 ft., so as to give room for an 800 ft. steamer. This may sound like making provision for remote posterity. But the air seems full of large projects for bigger cargo boats. The White Star Line is credited with an intention to build one of 15,000 tons, and Mr. Glynn, the President of the Chamber of Shipping, seems to think we shall soon see even that size exceeded. At all events Liverpool will be pleased if her new graving dock breaks Southampton's record for the biggest dock in the world.

#### New York Improvements.

The spirit of progress has crossed the Atlantic. I do not know which of the rival lines took it across. But it is evident that the port of New York, which seemed to consider itself entitled to a short rest on its laurels when it tackled the bar, has now determined to do something more for the facilitating of business. The inspecting medical officers are not in future to keep vessels waiting till daylight if they happen to arrive out after hours, and there will no longer be any considerable delay at quarantine, vessels being allowed to proceed direct to their docks irrespective of the hour. For the majority of passengers this boon may not seem very great. They don't want to leave the ship at unearthly hours of the morning if they can have a comfortable breakfast on board. But to thorough passengers in a hurry, who are condemned to idleness when they see that by a rush they could catch the train they desire, this will be a great blessing. In these days, too, when ships are turned round so quickly, every moment gained at the dock wall is a valuable advantage.

Meanwhile the great port on the Hudson is reaping the reward of its expenditure in the removal of its bar. From the unprejudiced columns of a Philadelphia paper I learn that the fine new twin-screw cargo boats *Southwark* and *Kensington*, hitherto employed on the original American Line service between Liverpool and Philadelphia, will cease to ply between these two ports on and after 1st of July, 1895. They draw too much water to use the port with ease and safety. There is plenty of cargo for them but the channel is not reliable. Here is a lesson for the Philadelphians. Big boats are the cheapest and fastest. But they can only be employed where channels are suitable and where "inducement offers" in the way of freight. In the latter direction Philadelphia has all that can be desired, and its merchants might have continued to enjoy the advantage of being served by fine ships. Its docks might have still reaped the harvest of dues calculated on big tonnages. It might still have gained for its railways a good share of through traffic to the West. Yet it has neglected its opportunities and must pay the penalty. When the *S. Louis* comes out there will be the *Paris* and *New York* to join with her in carrying on the three-weekly round in the New York and Southampton service, and I presume the *Chester* will go to the Antwerp and New York service, whilst the *Berlin* will lie for the present as reserve ship at Southampton. The Red Star service will supply old lengthened Cunarders, such as the *Pennland*—which I described in the summer—for the Philadelphia line, and Antwerp will gain the prestige of sailing the *Southwark* and the *Kensington*.

Speaking of the American Line, I must remind my readers of the death of Mr. Bromley, which I noticed in my December notes. This gentleman was third officer of the *Berlin*, and he was swept overboard from his vessel in heavy weather on her November trip from New York to Southampton. He was a Liverpool man, but when the line changed its headquarters he took his family to Southampton. So now Mrs. Bromley is a widow amongst strangers. She has a family of three young children, and I understand is likely to have an added responsibility in a few weeks. The position of her husband was anomalous. He was a British sailor on a British ship, but on an American Line. She there-

fore seems in a position to claim nothing from either side the Atlantic by right, but to deserve sympathy from both British and Americans in justice. I sincerely hope that those who feel able to do anything towards alleviating her hopeless sorrow by assuaging the added pangs of want will aid her. I am told that Messrs. Richardson, Spence & Co., are willing to receive subscriptions for Mrs. Bromley.

#### The Water-Tube Boiler

has, as a Navy question, come prominently to the front during the last few weeks. That is discussed elsewhere. But it must not be lost sight of that, if the Navy's faith stands on certain foundations, we are on the eve of a vast revolution in merchant shipbuilding. The busy days of the early seventies will come again for the marine engine builder. Contradictory reports as to the efficacy of the water-tube boiler have been promulgated by various writers in the columns of the *Times*. Messrs. Wilson & Co., of Hull, think that in it they have found an end of leaky tubes, and they have fitted, and are fitting, it to several large steamers of their fleet. Then, as I mentioned some time ago, it has been applied to one of the Newhaven and Dieppe boats, *La Tamise*. Mr. Ellis, the chairman of Messrs. John Brown & Co., of Sheffield, writes to the *Times* to say that this vessels burns

and which tend to prevent not only the defeat of the object but also the risk of the loss of the brave men who volunteer for rescue work)—but also for additional skill shown in certain exceptional manoeuvres executed which, if unsuccessful, might have imperilled his professional reputation. The hero of the occasion was, however, his chief officer, Mr. Basil Whitehead, a gentleman who has since his return entered into an engagement of a very different kind. It is very pleasant to see that, whilst public bodies gave formal recognition of these brave deeds, the owners of the Castle Line not only allowed their ship to be used as the place of presentation and entertained a large party with their noted hospitality, but also substantially rewarded their gallant employes themselves. To every sailor who took part in the service there was given a month's pay, whilst Mr. Whitehead received a cheque which will enable him to remember the *Fascadale* when he furnishes the home where we may trust he will have many years of happiness.

#### The "Oroya."

Accident and the Orient Line have long been strangers. It is therefore with great regret that I notice the stranding of the *Oroya*, one of their liners chartered from the Pacific Steam Navigation Co. She was leaving Naples in due course on her

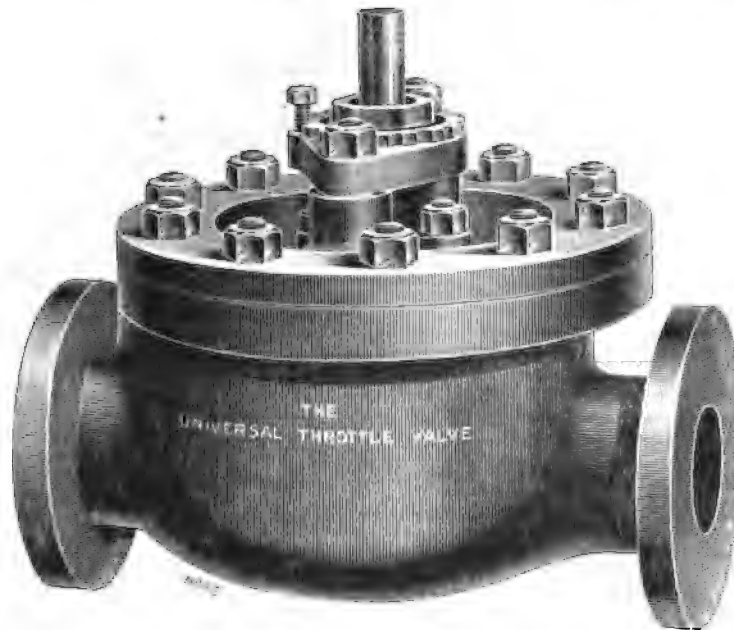


FIG. 1.

37½ tons of coal in a cross-channel trip against 27½ tons burnt under the same circumstances by a sister fitted with ordinary marine cylindrical boilers. If this statement be subject to no qualification it is a heavy blow to the reformers. For 20 per cent. more coal makes a thing a commercial impossibility. I fancy, however, from what I have heard, that later explanation will account for this statement and considerably modify its value.

#### The Winter Storms

have brought in many tributes to the bravery of those who officer and man the fleets of the Mail Lines. The rescues effected by the *Teutonic* and *Umbria*, of the Liverpool Mail Lines, have already been mentioned here. The cargo boats of the same lines, as represented by the *Tauric* and *Catalonia*, have not been behind their faster sisters and have been the heroines of equally gallant deeds which have met with recognition from the authorities. On the South African Line too, those on board the *Norham Castle* performed an action which has met with warm public recognition. Eighteen men were, by their means, saved when the sailing ship *Fascadale* was wrecked on the 7th February, 1895, on the coast of Natal. Captain Duncan, of the *Norham Castle* earned his reward, not only for the general supervision of arrangements which captains always take in such matters—(services which greatly contribute to the purpose of the salvage

outward voyage to the Antipodes when a sudden squall caught her and carried her on to the shoals. The weather was exceptionally bad then and since. The passengers were never in danger. They and their baggage and the mails were soon landed. The postal matter went on by the P. & O. boat after a week's delay; the passengers and their baggage by the next Orient liner. All the cargo has been got out, and as I write Mr. Armit, of the East Coast Salvage Co., is superintending the efforts to get the ship herself restored to her proper element.

#### DURHAM, CHURCHILL & CO'S PATENT THROTTLE VALVE.

IT will be generally conceded by engineers that the controlling power of a governor, measured by its effect on the engine, must naturally be dependent upon the efficiency of the throttle valve. Throttle valves in the main may be said to be defective, either by the fact of allowing sufficient steam to pass after they are closed, to keep the engines going

at a fair speed in smooth water, or to cause heavy racing in rough water, or, if sufficiently tight, they are very liable to jamb when shut, which is decidedly dangerous.

It may be said, that to efficiently control multiple cylinder engines it is absolutely necessary the throttle valve should be capable of cutting off the steam, not merely throttling it; and at the same time be easily and quickly operated, without liability to failure. To meet the great difficulties, defects and dangers attending the use of ordinary throttle valves, especially in connection with the high pressures and

Fig. 6 is a view showing the device as fitted on board the s.s. *America* of the National Line.

It will be seen by these illustrations that the valve is somewhat like a plug cock with a number of ports, the essential differences being that the seat and plug are surrounded by live steam. Thus there is uniformity of expansion, and no liability of distortion. It has a floating, balanced plug, subject only to a slight upward thrust (due to the taper), and retained in position by a collar on the spindle, bearing in a thrust block which is adjustable by screwing up or down through the bridge attached to the valve cover.

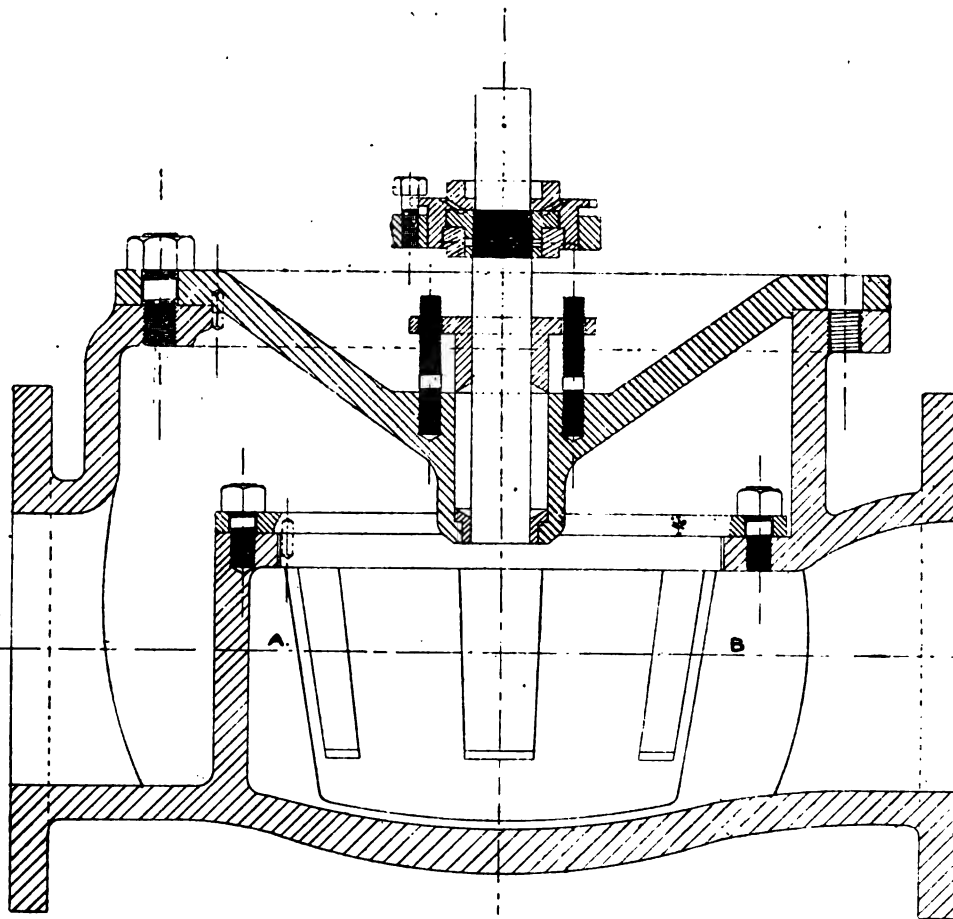


FIG. 2.

number of cylinders now in vogue, a new design of throttle valve has been brought out by Messrs. Durham, Churchill & Co., of 9, London Street, London, E.C., which we have pleasure in illustrating in the adjoining diagrams.

Fig. 1 is an outside perspective view of the valve complete.

Fig. 2 is a sectional view of the valve box with the valve removed.

Fig. 3 is a sectional view of the same with the valve in place, also shown in section.

Fig. 4 is a plan of the valve box.

Fig. 5 is a sectional plan of the valve and its seating.

The special advantages that are claimed for this valve may be summarised as follows:—

1st. It can be readily adjusted when under steam pressure to any degree of steam-tightness.

2nd. In case of emergency, it can be used as a stop valve.

3rd. It cannot jamb, as an ordinary throttle valve is liable to do.

4th. It is perfectly balanced for all practical purposes, as far as any difference of steam pressure between the two sides of the valve is concerned.

5th. The small traverse to open or close, allows the use of a long lever, thus giving great control and facility for operation of the valve.

6th. The plug and seat can be readily removed for renewal or other purpose, without interfering with the steam pipe.

The drawings certainly indicate that the advantages claimed above will obtain in valves made in accordance with them.

### NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondent.)

#### A Curious Mistake

seems to have been perpetrated by the naval correspondents of several of the daily papers. It refers to a notable vessel of the Brazilian Navy, the *Aquidaban*, which, as may be remembered

accounts of the engagement. It is much more probable, therefore, that the date in question is commemorative of her raising and her restoration thereby to the Government fleet. The mistake in itself is not of much importance, but it serves to show how mistakes are given currency and get embodied in history through the blind way in which information is copied without being checked or examined by those who absorb it.

#### Torpedo-Boat Destroyers

are very popular with the Admiralty just now. The Naval Estimates provide for the building of some 20 additional vessels beyond the 42 ordered last year. Most of the latter are now coming forward, and those tried have attained the contract speed with ease. Useful vessels and good sea boats as they are likely to prove, they are not beautiful. The *Hornet*, with her four funnels placed at unequal intervals, was bad enough, but the *Swordfish* from the Elswick yard will surpass her in point of strange appearance. She has three funnels only, but

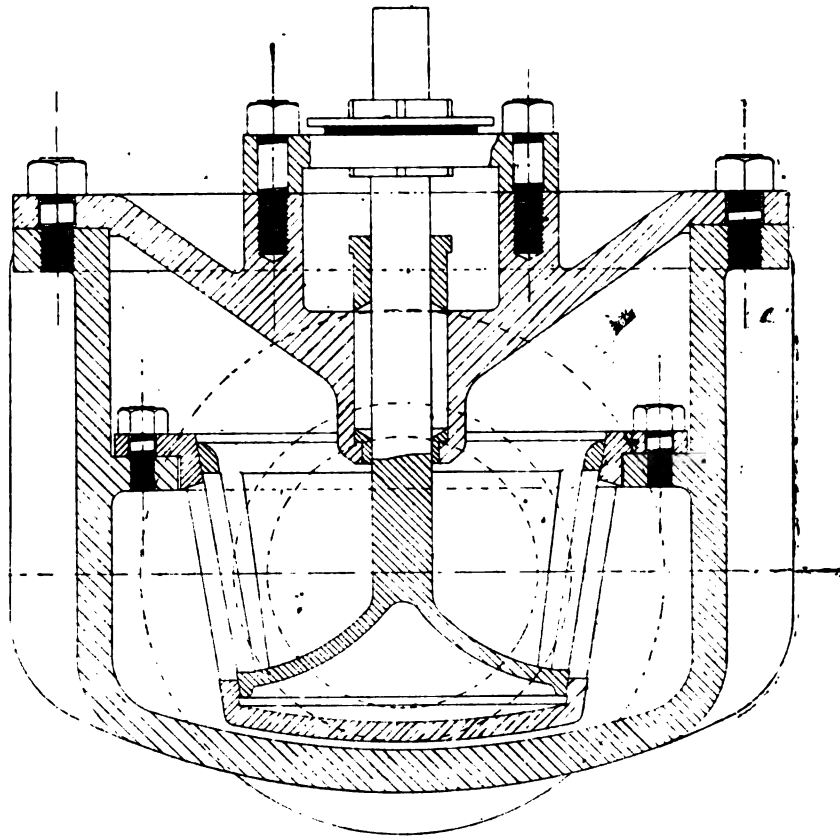


FIG. 3. PATENT THROTTLE VALVE.

by most of my readers, was torpedoed and sunk in the Brazilian Civil War. This tribute to the powers of the torpedo lost much of the significance owing to the fact that the ironclad was caught with her men ashore and her nets up. But this is not the point. The vessel sank, but, fortunately, in shallow water, and was subsequently raised and is to be re-boilered, the insurgents having treated her so badly that her boilers were completely worn out. Her name is now changed to *Vinte Quatro de Mayo*. "This," say the naval correspondents in question, "was in memory of the day on which she was sunk." Here they are wrong. To begin with it is extremely unlikely that the Brazilian Government would wish to commemorate a victory, which, however satisfactory, was merely a surprise, whilst, if they did wish to do so, they would probably not do so in the person of the rejuvenated vessel which was the subject of the matter. But on looking into the case I discover that she was sunk some time previous to that date, and that long before the 24th May the very journals in question had published in their news columns

the centre one does double duty and is accordingly of double size. The general effect of this arrangement is very curious. The details of the 20 new boats are not yet settled. It is, however, stated that as the leading builders have exceeded the stipulated 27 knots by a full knot on trial, the new contracts will be for 28, and that without making increase in the payment. If this be true, it will have a considerable tendency to discourage the healthy spirit shown by good builders in allowing a good margin of power for trial. There is also a rumour that a limit is to be placed upon the number of revolutions allowed for certain speeds. Though such a step may have a tendency to make the continued maintenance of a high speed more probable, it seems a great pity to tie the hands of contractors with so much red-tape. A more rational way of attaining the object would be to lengthen the period during which the mean speed must be maintained before the vessel is accepted.

#### The Sanspareil.

I mentioned last month that this vessel was to return from

the Mediterranean, and to be replaced by the *Barfleur*. It has since been announced that she is not to be altogether idle, for she is to be guardship at Sheerness. This is probably a very good place for her. Her construction and arrangements are of the modern type, and if a mistake was made in giving her such monstrous guns it can best be remedied by using her chiefly as a land fortress. From the waters of a harbour she would probably have no difficulty in fighting her big weapons, and when they were fought, the practice she would make would be of a nature of unparalleled destructiveness.

#### Russian Imperial Yachts.

Our continental neighbours seem to attach much greater importance to anniversaries—and especially to birthdays—than do our own people. Thus it was that the late Czar's birthday was fixed for the date of the launch of the new Russian Imperial yacht *Standard*, which took the water at Copenhagen on the

at Jarrow, largely for the purpose of carrying high diplomatic officials, are, with us, called "despatch boats." Then, the latest Imperial German yacht is in reality a swift ocean-going cruiser of a type which approximates more to our mail steamers in her proportion of boiler to engine power, and which would, therefore, be able to maintain a good average speed over a long passage. Though classed and used as a yacht, she is an important fighting ship. Our Royal yachts, *Victoria* and *Albert*, or *Alberta*, with their wooden hulls and exposed paddle wheels, could never fulfil any function but that for which they were primarily designed.

#### The French Navy.

M. Lockroy, the former French Minister of Marine, drew a very interesting comparison as to the condition of the French and British Navies in the French Chamber on the 11th March. If we could take all his statements as facts we might be very well

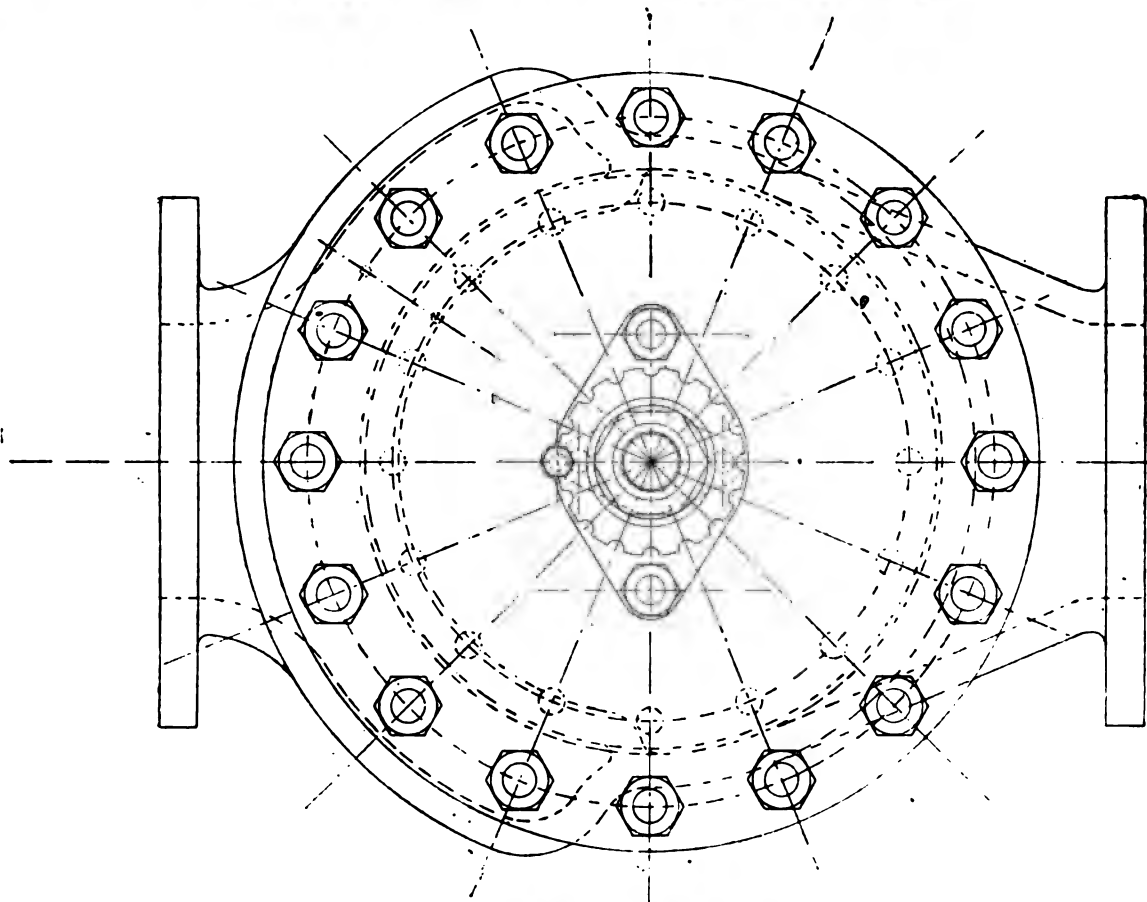


FIG. 4. PATENT THROTILE VALVE.

10th March, in spite of all difficulties raised by frost and ice. The name *Standard* is not a new one in the Imperial Navy, for there was a wooden paddle boat of this name built in 1858 at Bordeaux, which until recently was attached to the Black Sea Fleet. This vessel, however, only had a displacement of something under 1,000 tons, whereas her successor in title will be a twin-screw steel steamer of something like six times the size. Another Russian Imperial yacht has attracted attention during the month, though in a different way. This was the *Tsarevna*, which was taking the Russian minister from Athens to Corfu. She went ashore on a sandbank at Cape Drepano, on the south shore of the entrance to the Gulf of Corinth. She is not a vessel of much account, being a single screw iron steamer of 800 tons, just 21 years old, built at Hull. The Continental Navies contain many vessels classed as yachts which we should class quite differently. The *Alacrity* and the *Surprise*, for example, which were built some 10 years ago by Messrs. Palmer's,

pleased with our own state. Moreover, there are certain comments to be made on the facts, and these he naturally does not make. For example, he says, that our neighbours spend two-thirds of the amount we do on their navy. This, of course, he thinks is an argument for increased expenditure by the French. In good truth the drift is entirely the other way. If the small mercantile marine of the French requires so much police supervision and protection, ours should require infinitely more. When we regard the amount of our carrying trade, the amount of food we import into England for the maintenance of the population, and the raw material that comes in to keep our manufacturing classes employed, and see the same figures on the French account, we are convinced that England ought to have a very large balance on the right side so as to maintain the certainty of peace. M. Lockroy's allegations that the French ironclads could only make short voyages without replenishing their bunkers, and that many of them were fitted with out-of-

date guns are criticisms that would apply to many of our own vessels. Take for example the *Monarch* recently refitted at such a heavy cost for machinery. She is still fitted with old fashioned muzzle loaders. Not only is there the weakness caused by her comparative slowness of fire when matched against more modern vessels, but there is the fact that, owing to their exposed position when loading, it might be impossible for the most steady of gunners to fight the guns at all. That we can build faster and cheaper is certainly true. But are we progressing as fast in that direction as are our rivals? They seem to be, year by year, lessening our lead in these directions. The small extent of the duties of the French Navy were very well illustrated by the impossibilities of getting suitable French transports for the Madagascar Expedition. Merchant ships were needed, and to England they had to turn. French pride did not like this, and an outcry was raised against chartering British ships, but ships of a certain type were indispensable, and were only to be obtained on this side of the Channel, and so, instead of chartering, purchase was resorted to. This was perhaps a stroke of luck for the owners of the fine old mail steamer *Aconagua*, which is now the French transport *Egypte*, but it affords a good illustration of my point.

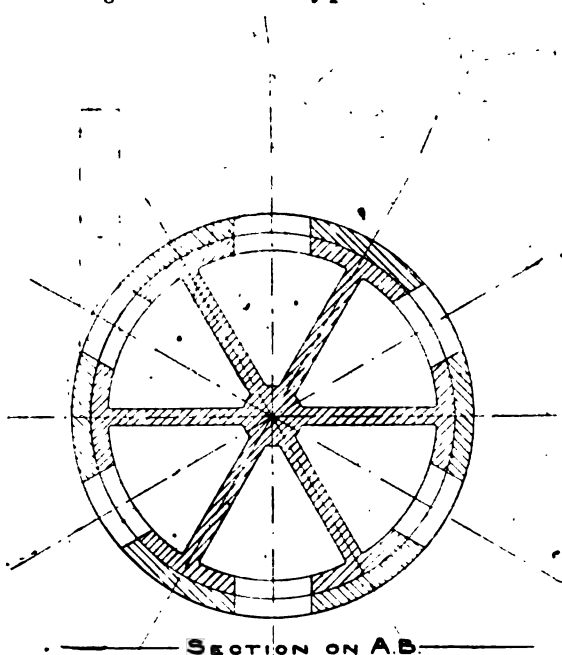


FIG. 5. PATENT THROTTLE VALVE.

#### Smaller Battleships.

In my last month's notes I mentioned that there was a feeling in certain quarters that the present dimensions of battleship were too great, and that the *Centurion* type was largely demanded. Since I wrote this the *Pall Mall Gazette* has cried out with the same voice. I do not venture to go as far as the writer in the *Pall Mall Gazette*, for I think the recent development of the big battleships has been in the right direction, and warships must ever be creatures of compromise; to get everything we must have size. The *Majestic* is certainly a better ship than the *Centurion*, and we are having ten new *Majestics*. We cannot, therefore, grumble that we are not to have any more *Centurions* at present.

#### Water Tube Boilers.

The Admiralty seems to have committed itself indefinitely to the water-tube boiler. A question was asked in the House of Commons about the experimental boilers fitted in the *Sharpshooter*, and it was stated that she had had a number of trials during the twelve months these boilers have been in use, one of them extending to a thirty hours' run, and that the

results of all this experience had in "each case been most satisfactory." This as to the Belleville boiler. But though the Belleville is so good, the Admiralty is not convinced that some other of the numerous types before the public may not be better, and the *Sharpshooter's* sisters are to be fitted with water-tube boilers of other types so as to arrive at some conclusion as to which, amongst water-tube boilers, is the best type. As time goes on and the Admiralty becomes more and more deeply committed to the water-tube type—for we now have not only the *Powerful* and *Terrible*, first-class cruisers, building in private yards, but also the new third and second-class cruisers of the 1895-6 estimates designed for this class of boiler—one cannot but regret, for the sake of knowledge, that Messrs. Maudslay, Son & Field could not see their way to accept Mr. Howden's challenge as to a trial of the comparative merits of the cylindrical and water-tube boilers under equal conditions. If that trial had come off, there would have been an end to doubt and uncertainty, not only for naval but also for mercantile purposes. Mr. Howden, of course, in making the challenge, proclaims his absolute faith in the old type of boiler. It does not, however, by any means follow that Messrs. Maudslay, Son & Field by not accepting that challenge show any want of faith in the new design with which they have so prominently associated themselves. They are Government contractors, and as such are rightly bound to preserve a certain decorous reserve and unreadiness to be drawn into newspaper warfare. Indeed, in any case I should be inclined to think them wise to have declined the challenge, for though, of course, for mercantile purposes it would be well for them to be able to say, "Our goods give — per cent. more efficiency with the same prime cost and the same running expenses and weight as other people's," it would certainly not be good policy for the British Government to proclaim aloud any find that it might make. For other nations are always on the watch for improvements, and it would be absurd for us to give away the advantage that our smartness has earned for us. Mr. William Allan, M.P., has severely criticised the Admiralty for giving its adherence to the water-tube boiler. He, however, showed that his knowledge of affairs is not up to date, and he has given those who are moving more with the spirit of the times an opportunity of emphasising the progress which the new appliance is making in various directions. Such progress is very quiet and not very noticeable. But that is, perhaps, one of its most satisfactory features. If its followers had not been so eager to rush forward some twenty-five years ago it would probably have been generally established ere this as the universal steam-generator.

#### The Spanish Navy

has, during the month of March, received an addition and sustained a loss. On the 12th there was launched from the Vea Muglia Shipbuilding Yard at Cadiz a new steel built twin-screw cruiser—the *Emperador Carlos Quinto*. She is a vessel of the first class. A comparison may usefully be made between her and the British cruiser *Blenheim*. We see that she is 5 ft. longer and has 2 ft. more beam. With about 6 in. less draught, her displacement is 89 tons greater. The forced draught power is to be 18,500 H.P., against 20,000 in the British cruiser, whilst the speed will be only 20 knots against our 22 knots attained. The bunker space will, however, be 250 tons greater, and thus she should have a greater radius of action at cruising speed, unless—as seems not unlikely—her greater beam should make more power necessary to drive her. The protection of both vessels is obtained from a steel deck of a maximum thickness of about 6 in. The offensive power of the *Blenheim* consists of bow and stern chasers of 9.2 in. calibre. Those of the Spanish ship are designed to be of about 11 in. Whilst, however, the British ship has ten 6 in. guns on the broadsides, the Spaniard is but to have eight, and she will not carry so many smaller quick-firing guns. On the whole—especially when we consider the fate of the *Reina Regenta*, which I shall refer to in a moment—it would appear that the comparison is decidedly in favour of the British vessel, a fact which is satisfactory when it is remembered that the *Blake* and *Blenheim* were launched six years ago, since when considerable experience has been gained. We look to have far better ships than she in the improved *Blenheims* of the 1895-6 Navy Estimates. The loss which the Spanish Navy has sustained has been a terrible one indeed. A very fine modern ship, the *Reina Regenta*, has gone down with every soul on board. Four hundred and twenty men have perished. The fact is undoubted though no soul survives to tell the tale.



After performing a duty which was entrusted to her because of the fact that she was a ship well calculated to give a good impression of her country's navy, she sailed on the short trip from Tangier to Cadiz. A little while after her departure a storm of unexceptional severity arose. It is said that she was seen the same evening with upper works damaged and making very bad weather, but this report still lacks confirmation.

barometrical indications of what was coming, should be overwhelmed by the force of any weather. There is only one clue suggested. That is a hint that, since she was delivered, her bow chaser has been replaced by a heavier piece. If this is so the explanation is not difficult. Her reserve of buoyancy forward was unduly cut down and she could not rise to the seas. In that case she was bound soon to be overwhelmed. This

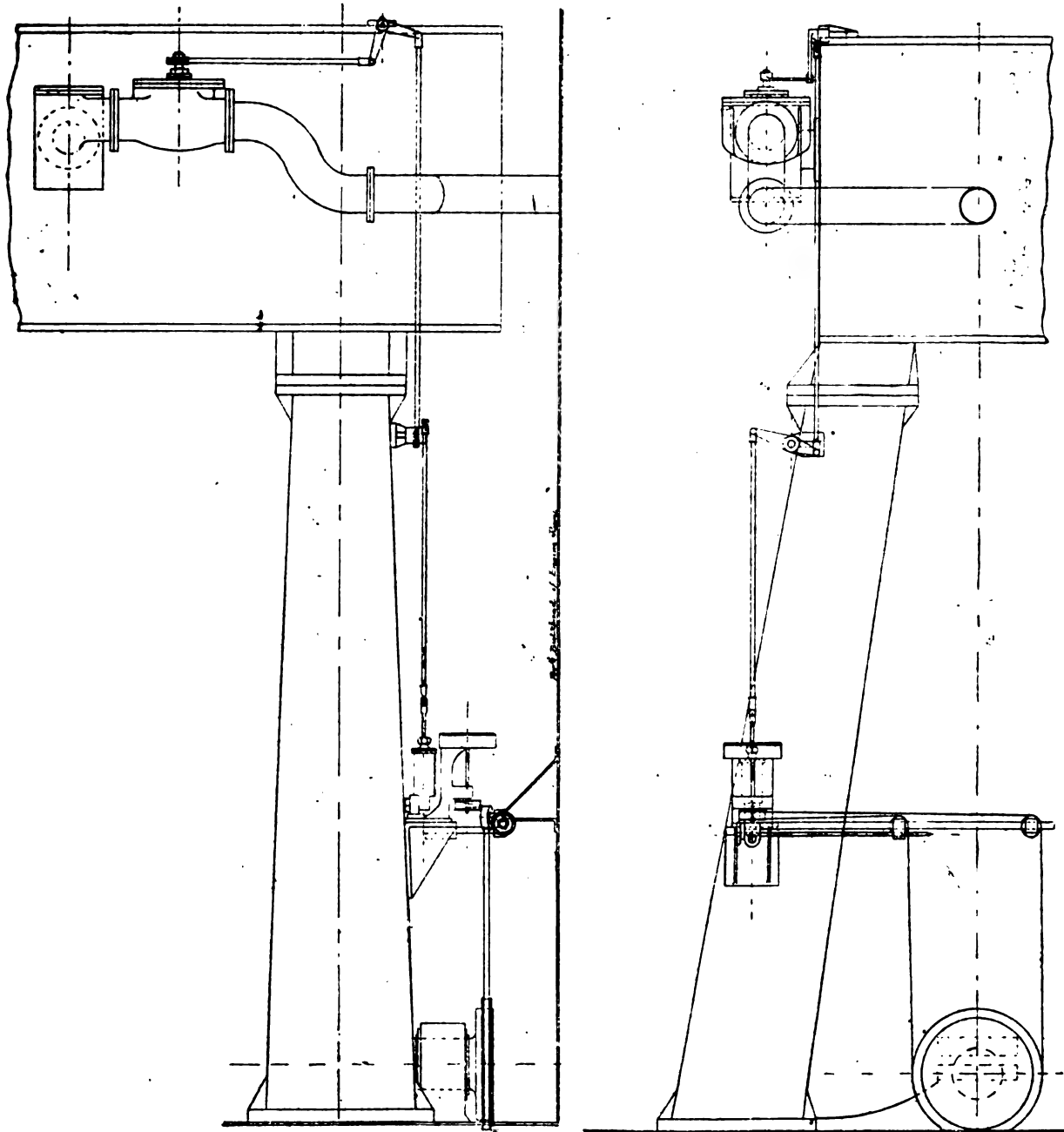


FIG. 6. PATENT THROTTLE VALVE.

What, however, is certain, is that she lies in deep water off Conil, at the entrance to the Straits of Gibraltar. It would seem unlikely from what has been heard so far, that she can be raised, but it is certain that she is not too deep for an examination to be made by divers, and it is to be hoped that this will be done, and done carefully. It is a terrible and disquieting reflection that this vessel, built by one of the best firms in the world, fully manned by a crew of hereditary sailors, with

hypothesis is a little strengthened by the knowledge that, whereas she is a vessel very like the second-class cruisers built under our Navy Defence Act, such as the *Charybdis*, which only carries a 6 in. gun forward, and another aft, besides, of course, her broadside guns, the *Reina Regenta* is credited with 9 in. guns. But whatever may be the cause of the disaster we cannot fail in sympathy with a nation which has sustained so heavy a loss.



### The Late Admiral Sir G. P. Hornby.

The terrible mortality of the present season has shown itself almost more severe amongst Naval men than amongst other classes of the community. The Navy and the country has sustained an irreplaceable loss in the death of Sir Geoffrey Phipps Hornby. Full of vigour and energy, which, had he been spared, would have still been at his country's service, he retired from active service just a month before he was struck down. As a distinguished tactician, and as a leader of men we shall not soon look upon his like again. His views as to the necessities of the Navy, and as to the vital need of our keeping up our strength in the Mediterranean were well known, and it was with full appreciation of the work which it set before it, that he accepted the presidency of the new Navy League. That organisation has in his sudden death sustained a blow which might well stagger it. But at the moment there are so many things which show that there is a great work for the League to do. The present Navy Estimates show that at present the Government will spare no expense on the Navy. At present the expenditure may be sufficient. But what guarantee have we, in the maze of irresponsibility at Whitehall, that this expenditure is properly applied? Straws, we are told, show the direction of the wind, and from one sample of Admiralty dealing we may learn something of the general practice. The troopship *Tamar* has some little time been on sale. The memory of man scarcely runs to the time when the *Victor Emmanuel* was not receiving ship at Hong Kong. Nothing can have transpired lately to affect these ships which might not have been foreseen when the *Tamar* was offered for sale. Yet suddenly the Admiralty countermand their orders to the Dockyard authorities: the *Tamar* is to be withdrawn, and is to go to Hong Kong to replace the *Victor Emmanuel*. To enable her to accomplish this voyage her masts and rigging, lately removed—at some cost, of course,—is to be replaced at an estimated cost of £1,700. Her engines will need an expenditure of £3,000 to fit them for the voyage. That is all very well. They are probably no worse now than they were when she was last under steam, and the money would have to be spent on them in any event to carry her to the East. But what I do think needs attention is this vacillating policy which pulls down and then restores what might have been left alone.

### The Navy Estimates

are satisfactory in that they show an increase in most departments and are a very strong proof that the present Cabinet is not unmindful of the Navy and its needs. It is, however, unfortunate that the misprint in the *Times* was, in fact, a misprint. The usually carefully edited daily informed its readers that £90,000 was to be spent on the engineering branch, in excess of what was included in these of the preceding financial year. It turns out that there was a cipher too many in the figure named, and that the whole benefit offered was the not very alarming sum of £9,000. Thus it is still a fact that in our service a fleet-paymaster or a fleet-surgeon may get 33s. per diem whilst the fleet-engineer's maximum is 26s. per diem. The paymaster and surgeon are very useful personages, and their luck need not be objected to, but their responsibilities are nothing to those of the officer of the Engineering Department, and it will not do to leave this matter alone until at least equality is gained for the engineer. Most unprejudiced persons would be inclined to say that he is clearly entitled to actual superiority.

Lord Brassey, in the House of Lords, pressed the Government to strengthen the Navy not only, as they are doing, in the actual number of men serving under the flag, but also by making a strong reserve. Lord Spencer, speaking as a departmental chief, raised difficulties which he alleged were in the way of the adoption of what Lord Brassey and Lord Hood of Avalon urged upon him. But there is little doubt that after being emphasized so strongly by such men there will be some scheme or other to meet the need they point out, formulated at Whitehall.

### The New Battleships

are to be armed with a 12-inch 50-ton wire gun, of which great hopes and expectations were formed. It is satisfactory to learn that trials have been made of one of these guns and of its carriage, on board the experimental gunnery ship at Portsmouth, and that everything stood the test well.

### The "Diogenes."

There was a fine scare in the Thames in the middle of March.

A strange man-of-war came out of a building-yard near Mill-wall and proceeded to run trials on the Maplins. Memories of the trials of the *Alabama* and her escape and all that resulted therefrom came over the authorities, who wisely determined that we should not again be mulct in heavy damages for letting vessels go to belligerent powers. The *Diogenes* was allowed to run her trials, but a guard of British blue-jackets was maintained on board throughout the proceedings. It was alleged that the vessel was being tried previous to her sale to one of the powers now fighting in the far East. Her owners deny the suggestion, saying that she was merely being tried because they wished to know her capabilities. The vessel was built, as far as I can remember, in 1883. Several correspondents have stated that she was built at Southampton. This is, I think, a mistake. A continental yard had the honour of turning her out. Her history is involved and she has never done anything. For the best part of her life she has lain in the Thames where I went over her and her sister some three or four years ago. She is not of great size, but has considerable speed and might prove very useful to a fighting power which could acquire her now.

### A MARINE TYPE DONKEY BOILER.

WE illustrate herewith a well-designed and finished boiler of the well-approved double-flued return tube marine type, as it stands slung from a powerful derrick in the yard of the Dunston Engine Works, Limited, of Gateshead-on-Tyne. As will be seen, the longitudinal seams subjected to the greatest pressure are triple-riveted, with the central row of rivets of the usual short pitch, and the outer rows of long pitch, the rivet holes being drilled in place, and rivetted up by special plant of rivetting machinery. The design is noteworthy for a large steam chest surrounding the uptake, where the steam is collected not only dry from priming, but where it is also slightly super-heated, saving much condensation in the cylinders, and adding to the elasticity of the steam by the utilisation of what would otherwise be waste heat. The smoke box is fitted with the usual flap doors, through which the tubes are readily accessible for cleaning and repairs, and these doors have an internal double plate for their protection against the heat.

Boilers of this description are, we understand, being largely adopted on steamships, and a large number are on order with this firm, the super-heating arrangement having been very favourably received.

The Dunston Engine Works have lately gone to great expense in equipping their works in the most approved manner for boiler work, by putting down rivet drilling, rivetting, and flanging machinery of the latest type, and their jetty is furnished with shear-legs of exceptional power, to deal with heavy boiler work promptly and effectively. We understand they have recently supplied a marine type boiler, built under the Board of Trade survey to the Tyne General Ferry Co., which has given complete satisfaction.

It will be in our opinion by such fresh designs as this, and by attention of boiler makers to saving every pound of coal in evaporation, and securing a good supply of dry and possibly super-heated steam, that the rivalry of fire tubular boilers as against water-tube boilers, the latest craze, will be maintained.

Messrs. The London and Glasgow Engineering and Ship-building Co., Govan, have contracted to build a large steel steamer of about 4,600 tons capacity for the Glen Line managed by Messrs. McGregor, Gow & Co., Glasgow.

## OBITUARY.

## THOMAS HENDERSON.

THE death hastaken place of Mr. Thomas Henderson, leading partner in the Anchor Line of steamships, the melancholy event occurring at his residence, 14, Blythswood Square, Glasgow, on the 24th February. About four months ago the deceased gentleman, who was in his 75th year, was laid aside from business with a serious ailment which developed into hemorrhage of the stomach while staying at his country residence, Crosslet House, Dumbartonshire. Recovering from this illness, he returned to his town residence early in February, the severity of the weather, however, keeping him within

broking business, assumed Mr. Henderson as a partner; the title of the firm being changed to Handyside & Co. Following upon Mr. Henderson's accession, the firm acquired new sailing ships, and traded with them on the American and Australian coasts, and some time subsequently, when the name of the firm had been changed to Handyside & Henderson, a line of steamers were started between Glasgow and Lisbon and the Mediterranean. Some years later, on the retirement of the Messrs. Handyside and the assumption of Mr. John Henderson—brother of Thomas—and other partners, the firm became Henderson Brothers. Under this designation, and largely owing to the business energy, tact, and keen practical knowledge of Mr. Thomas Henderson, who was for long the dominant partner, the steam shipping business developed and extended under the title



A MARINE TYPE DONKEY BOILER.

doors. In spite of care, however, he seems to have caught a cold which developed into bronchitis and congestion of the lungs, and to these complaints he succumbed on the date stated. The deceased was a native of Pittenweem, one of the quaint fishing villages situated on the Fifeshire coast, and from a very early age had a liking for the sea. Coming to Glasgow as a youth, he entered into the Mercantile Marine service as an apprentice. He had more than ordinary rough probationary experience, but not for long, and he was fond of stating that he had entered the seafaring calling "through the hawse hole," and had worked his way aft to the cabin. He rapidly rose through the different grades of his calling, and qualified himself as shipmaster, eventually taking command of various sailing ships and steamers belonging to Glasgow. In 1853, the firm of Messrs. N. & R. Handyside, engaged in general ship-

building business, assumed Mr. Henderson as a partner; the title of the firm being changed to Handyside & Co. Following upon Mr. Henderson's accession, the firm acquired new sailing ships, and traded with them on the American and Australian coasts, and some time subsequently, when the name of the firm had been changed to Handyside & Henderson, a line of steamers were started between Glasgow and Lisbon and the Mediterranean. Some years later, on the retirement of the Messrs. Handyside and the assumption of Mr. John Henderson—brother of Thomas—and other partners, the firm became Henderson Brothers. Under this designation, and largely owing to the business energy, tact, and keen practical knowledge of Mr. Thomas Henderson, who was for long the dominant partner, the steam shipping business developed and extended under the title

and active interest in all seafaring matters, and devoted much of his time and ability to the management of various bodies associated with the shipping interest. At the time of his death he was chairman of the Local Marine Board, and from the first occupied a similar position at the Clyde Lighthouses Trust. He took a deep and active interest in the Clyde training ship, and in his capacity of chairman of the Committee of Management he did much to promote the usefulness of the institution. He was for long chairman of the Glasgow Shipowners' Association, and a director of the Glasgow Chamber of Commerce; and was formerly for a considerable period a member of the Clyde Navigation Trust. Among other important appointments conferred upon Mr. Henderson was that of president of the Chamber of Shipping; but unfortunately, owing to the state of his health at the time, he was unable to take the chair at the annual meeting. As a manager of the Glasgow Sailors' Home, he further showed his practical interest in those who "go down to the sea in ships." Mr. Henderson was twice married, and is survived by his wife and four sons and a daughter. His sons are partners in the great shipping concern of which their father has been so long the honoured chief, and his daughter is the wife of Dr. John Murray, of the Challenger Expedition. The announcement of Mr. Henderson's death was received with unfeigned regret in shipping and mercantile circles, and on the day following the melancholy event, the vessels in Glasgow harbour had their flags half-mast high.

#### MR. LINDSAY BURNET.

WE have to record with deep regret the death of Mr. Lindsay Burnet, of Moore Park Boiler Works, Govan, Glasgow, which event took place on the 14th ult., at Dunblane Hydropathic, where the deceased gentleman had gone to recruit. Never a physically strong man, Mr. Burnet had long been in rather poor health, and some time ago, in the hope that he might get his system set up, he took a voyage to, and a cruise in, the West Indies. This extended over several months, and it was thought that he would ultimately recover his strength. In the month of December, however, he caught a chill, which settled in his lungs; but from that also he was recovering, and was arranging for a visit to Madeira, when he was attacked by influenza, to which he succumbed on the date stated. Mr. Lindsay Burnet, who was the second son of Mr. John Burnet, father of the architectural profession in Glasgow, and brother of John James Burnet, Assoc. R.I.B.A., was one of the younger school of engineers, and had already made a name for himself in the construction of steam boilers, the special department of his profession to which he devoted his skill and his business abilities. He has been cut off at the early age of 39 years, in the midst of his work, and with abundant promise for the future. The major part of his apprenticeship was served in the works of Messrs. Barclay, Curle & Co., Whiteinch, and finished with Messrs. T. Wingate & Co., Whiteinch, a firm now defunct, who were well known for their extensive work in the building of steam dredging plant. For a short time, after the expiry of his apprenticeship term, he went to sea in order to get further insight into the business of mechanical engineering. Subsequently he settled in London for some time, and entered the office of Messrs. Bruce & Batho, civil engineers, Westminster. While residing in London he became a student in the engineering department of University College, where he had the benefit of instruction of a high order from Professor A. B. W. Kennedy. After a year or two Mr. Burnet returned to Glasgow, and about a dozen years ago he commenced business on his own account as an engineer, choosing more especially the department of boiler-making, for which purpose he erected the well-known works at Moore Park, Govan. He laid out these works with much judgment and skill, specially adapting them for the aim which he had in view, and to which he adhered throughout—his desire being to turn out work of the best description and of the highest class. A few years after he began the business, he was joined, at his own request, by a partner, in the person of Mr. Sinclair Couper, who had been a fellow apprentice with him. The business at the Moore Park Works was thenceforward carried on under the designation of Messrs. Lindsay Burnet & Co., and from these works there has been an extensive and constantly growing output of boilers and boiler plate work to home and export order. Mr. Burnet was not only a specialist in designing and constructing steam boilers, but he latterly devoted very much attention to the deeper kindred questions connected with the combustion of coal and other fuels, the analysis of these fuels,

of the waste products of combustion and of different qualities of water—all in order that he might be a better master of his subject and better fitted to give professional advice to those persons who consulted him. As an arbiter and expert his services were much in request in cases of dispute or difficulty, and to all such cases he devoted the same close and painstaking attention as characterised all his work. The deceased was either an associate or full member of all the following scientific societies:—The Institution of Civil Engineers, Institution of Mechanical Engineers, the Institution of Naval Architects, the Institution of Engineers and Shipbuilders in Scotland, and the Philosophical Society of Glasgow. Mr. Burnet was a man of rare enthusiasm in his profession, entering with his whole heart into everything connected with it. He was also a man of a most winning disposition, and endeared himself to all those who knew him. His employees found him to be one who had their interests at heart and his relations with them was always most cordial.

#### ENGINE-ROOM PRACTICE AT SEA.

PAPER READ BEFORE THE CIVIL AND MECHANICAL ENGINEERS' SOCIETY, JANUARY 31ST, 1895, BY W. M. BINNY.

THE object of this paper is not to describe the duties of the engineers of one of our first-class liners, but the everyday life on board an ordinary merchant steamer, commonly known as a "tramp."

This style of steamer carries a chief, second, and third engineers, but on a long voyage, or to ports to which it is necessary to go through the Red Sea, a fourth engineer is generally carried; the actual number being settled by certain Board of Trade regulations.

The chief engineer is responsible for the proper working and repairs of the machinery placed in his charge, also for the consumption of the fuel and stores. The actual work is carried out by the second, third and fourth engineers, who each take a watch at sea, and, in port, each junior engineer has a certain portion of the engines to overhaul and adjust.

Supposing the ship is ready to start on her voyage, and the crew on board, the chief engineer receives orders from the captain to have steam for a certain hour, at which time the engines will have been warmed up, and ready to be worked, according to the orders from the bridge, as shown by the engine-room telegraph.

After the pilot leaves the ship the engine-room department generally settles down to their every-day duties.

The general arrangement of watches at sea being for the fourth engineer to take the chief's watch from 8 to 12, the third engineer from 12 to 4, and the second engineer from 4 to 8, thus each has four hours on watch and eight hours off, day and night. The chief engineer, if a fourth is carried, does not actually stay down in the engine-room during the four hours of his watch, but after giving orders to his juniors as to the amount of steam, vacuum, &c., to be carried, and after linking up the valve-gear, and if all is working well, leaves the engine-room in charge of the engineer on watch.

I will now briefly describe the general duties of an engineer on watch. On eight bells being struck the engineer going on watch should make it a point of being down promptly in the engine-room to relieve the previous watch, and, after noting the number of revolutions on the counter, his first duty is to test the water-gauges in the boiler, and see for himself that they are working properly. He should then try the bilge-pump and see if the bilges are free of water, and likely to continue so. Much damage has been caused to cargo by allowing the bilges to become flooded, also the danger of washing up the stoke-hole floor plates. After going round the engines and trying, by feeling, if the bearings, &c., are cool, and receiving any directions from the engineer going off watch, will exclaim, "All right," which is understood to mean that he is now in charge.

After seeing the fires are properly cleaned, the engineer will now give his attention to various parts of the engine that require it, besides carefully noting from time to time the height of water in the different gauge-glasses, especially if the ship is rolling. Towards the end of the watch he will make up (truthfully, we hope) his log on the engine-room slate, stating the steam vacuum, temperatures of feed-water, injection and engine-room, &c., and if coal is being measured, the quantity

consumed during his watch. And on being relieved in his turn will make over the charge to the next engineer.

It must not, however, be supposed that after coming off watch a sea-going engineer has the next eight hours to himself. There are various small jobs that require his attention; for instance, the winches require overhauling and adjusting ready to discharge cargo on arrival at the next port; there are certain joints that show a tendency to leak or blow out, and if the chief does not want assistance to take indicator diagrams, then, perhaps, the engineer may count upon a few hours to himself.

With regard to the machinery itself, the usual type of engines for sea-going cargo-boats is the inverted, triple-expansion, and surface-condensing, working with a steam pressure from 150 lb. to 180 lb. per square inch. The most economical speed of the ship—from the shipowner's point of view—being between nine to ten knots per hour.

The boilers are mostly of the cylindrical multitubular type, although in some of the more recent cargo steamers water-tube boilers have been put in and appear to answer very well so long as fresh water only is used. With regard to the cylindrical type, with which most of my own experience has been, I have found that one of the worst troubles, namely, the leakage at the circumferential seams, may be greatly reduced, if not altogether avoided, by taking ample time to warm the boiler up on getting up steam: say about 12 hours, the lower fires, if three-furnace boilers, being lit first and the others a few hours after. The boiler should also have some arrangement for circulating the water while steam is being raised, either a "hydrolimiter" or the usual feed donkey may have connection, so that water may be pumped from the bottom of the boiler and returned through the usual feed check valve. Also the practice of blowing down boilers with steam up when they are to be emptied at the end of a voyage; the proper way being, in the opinion of myself and other sea-going engineers, that the boiler should be allowed to cool slowly, until the hand can be placed upon it without inconvenience, and then to slack back and force in one of the bottom doors, so allow the water in the boiler to run into the bilges from whence it can be pumped overboard. This not only preserves the seams, but should there be any scale taken into the boiler with the feed-water it does not get baked hard into the plates.

Another very serious matter with the high pressure now used in steamers is the injury caused by the presence of cylinder-oil in the boilers causing the furnace crowns of boilers to collapse, this oil coming from the cylinders with the steam into the condenser, mixes with the feed-water and is sent into the boiler. There are several methods of trying to prevent this occurring. Firstly, by using as little oil in the cylinders as the engines will work with, and then only mineral oil of the best possible quality. I have noticed that most oil is required in the cylinders, when the vessel is going in or out of dock, and the engines are being run alternately ahead and astern. This also causes other injuries to which I will refer in another part of this paper. But when the engines have settled down to steady work the oil may be reduced in some cases as low as 1 drop in 65 revolutions with engines indicating about 2,500 H.P. Cases have been mentioned where no oil was put in the cylinders, but probably the oil used to lubricate the piston rods found its way to a certain extent into the cylinders. Secondly, by using a feed-water filter, fitted in duplicate so that one may be cleaned while the other is at work.

Thirdly, should, however, oil be found to be making its way into the boiler—and its presence is to be noticed in the gauge-glass—by careful use of the scum cock a great part may be got rid of before it settles down towards the bottom of the boiler.

Another point with regard to marine boilers—and I think I may safely say any other type—are the boiler fittings. The most important being the water gauge, this fitting as well as all the others, should be very carefully and substantially made, and should be of the automatic shut-off kind, at any rate for the water, but at the same time should be so constructed as to be easily cleaned, and not liable to show false-water.

In the other fittings, namely, the feed check and steam stop valves, there is room for great improvement. I have found that they require constant attention to prevent leakage, and when the gland is screwed up and left for any time, on attempting to open or shut the valve, the spindle is strained, if not broken.

I will now mention some of the parts of the main engines that have given trouble to engineers at sea.

Before metallic or semi-metallic packing was made, trouble was found in keeping the high-pressure cylinder piston rod and valve spindle glands tight, in triple-expansion engines. If the glands were packed with the old style of canvas packing mixed with rubber, etc., in about 48 hours steaming the gland would commence to blow, and if tightened up, would soon start again, and would end by the engines being stopped to pack afresh. On the packing being taken out the rubber would be found to resemble the earth in flower pots, and the canvas quite rotten. All this, however, has been done away with with the introduction of metallic packing, made in sections of Babbit's metal, or Lindsey's compressed brass wire and asbestos packing, also Beldam's, &c. I have found in several cases, where one of the above types did not quite answer, to work with some of each: in cases, for instance, where the piston rod did not run quite true, but worked from side to side. Another point about packing high pressure glands is, that if the bottom of the cylinder inside is not formed so that any water that collects does not drain away from the centre where the gland is, I think I may venture to say that the difficulties of keeping that gland tight for any length of time is greatly increased. In practice I have seen a small  $\frac{1}{2}$  in. drain valve fixed near the gland and left slightly open to drain into the hot-well, with a marked improvement.

Referring back to a former portion of my paper, I mentioned that certain injuries were caused by reversing the engines in coming out of port. It is the practice in some vessels to screw up all piston rod glands before starting the engines. The consequence is, that the packing is greatly cut up by the rod working first on one guide and then the other. If, on the other hand, the freshly packed gland is screwed up hand-tight and allowed to blow a little, it will often be noticed that after a while the packing appears to swell, and the blowing decreases; after the vessel is fairly on her voyage the gland may then be nipped up until there is no visible leak, it will very often then run for some time without further attention.

The next part that now claims attention are the working surfaces of guides and bearings. The main bearing bushes are now usually cast-iron and lined with white metal, the bottom half being made circular, so that it may be taken out to examine and repair without first removing the shaft. The two halves of the bushes are kept in place by means of a cast or wrought iron key, and if good wide oil-ways are made and the bearings kept in line, there is no necessity for the practice of using water to keep them cool. The thrust block is usually of the horseshoe type lined with white metal, and if the casting will allow it, the recess is filled with a mixture of oil and fresh water. This arrangement lubricates the rings on the shaft, requiring very little attention, and very economical in the use of oil.

A part of the shafting that requires careful looking after when in dry dock is the tail-end shaft and stern tube: it is generally found to be badly corroded on being withdrawn, especially close up to brass-liners. Various plans have been tried to remedy this, either to entirely cover the shaft with brass-liners or one of Mr. Mudd's india-rubber covers which appear to answer very well, or some arrangement that would entirely exclude the water from the interior of the stern tube.

In connection with the engines and boilers there are several kinds of pumps for different purposes, among them the air and feed-pumps. The air-pump is usually worked off the main engine by means of levers and a cross-head. To the same cross-head is attached the feed and bilge pumps, which should be arranged in duplicate so that one may be repaired without stopping the other. The valves and connections should be arranged so that they may easily be got at. A good arrangement for the boiler feed is to have independent feed-pumps of the Weir's type in conjunction with a feed-heater and evaporator. By this means it is possible to put the feed into the boilers near the boiling-point, the evaporator being used to make up losses of water from glands, &c., with fresh water. A rough rule being 1 ton of fresh water per day for every 100 I.H.P.

The evaporator may be considered as being a part of the boiler arrangement in a modern steamer. It is in this apparatus that the scale is deposited and the salt removed, that was formerly done in the main boiler itself, with this difference, that if the scale was allowed to form sufficiently in the boilers, it would, in the first place, take more fuel to make the same quantity of steam on account of the non-conducting properties of the scale, and might even, if allowed to go too

long, cause the collapse of the furnaces. But in the evaporator no harm is done, the apparatus merely becoming less efficient until cleaned again, this operation is easily done at sea in a few hours. In practice I have known a steamer in which I served to fill her boilers with fresh water in Australia, and after some weeks on the New Zealand coast, to return to England, and, after being several days in dock, during which time the boilers were fed with dock water, on the density being taken, it was not quite 1.32nd or a little less than ordinary sea water.

With regard to spare gear, or the duplicate portions of the machinery, to be carried in the engine-room, all vessels are required to carry certain bolts and nuts, &c. Some vessels that have a large number of duplicate parts on board never seem to break down and require them, while others are very unfortunate in this respect, and the part that gives out generally happens to be that of which there is no duplicate. In this case something has to be contrived to substitute it. For example, a vessel in which I served broke her circulating pump rod when some distance through the Red Sea, and as we had no duplicate, and could not proceed to any port to get one, a substitute was found in one of the gangway ladder davits, which was nearly the same diameter, about 8 in., but had to be straightened and cut to the right length, the tools on board to do it with being the usual rivet forge, a few chisels, and hammers, &c. The davit was first cut to the required length, about 3 ft. 6 in., and the ends tapered to fit the bucket and crosshead. This was accomplished partly by drawing out in the small forge, and partly with chipping and filing; but as we had no tools to cut a new thread, the bucket and the crosshead were counter sunk; then afterwards the rod was heated and rivetted over in position, the whole repair being done by the engine-room staff of four engineers and Lascar firemen in 9½ hours, from the time of stopping to time of starting again. This rod carried us from the Red Sea to Singapore at the usual full speed.

From the above example it was not so much the requirement of spare gear but want of handy and useful tools, and as many vessels carry electric light plant, these could be used in any part of the engine-room and driven by a small motor.

## DIGEST OF RECENT DECISIONS OF THE HIGH AND APPEAL COURTS OF THE UNITED KINGDOM ON SHIPPING CASES.

### Interpretation of Charter-party as to freight payable.

THE plaintiff, who owned a ship, chartered her to the defendants for a voyage from New Zealand to London. It was agreed that the freight should be "a lump sum of £4,000 sterling." The following clauses were contained in the charter-party, viz.:—"The charterers to have the privilege of re-chartering the vessel, at any rate of freight, without prejudice to this agreement, and the captain to sign bills of lading (Australian and New Zealand trade) for the cargo, according to the custom of the port, at the current or any rate of freight required, without prejudice to charter-party, for which purpose he is to attend daily at the charterer's or their agent's office during business hours if so required, and should the freight list, according to the bills of lading, show a less sum in the aggregate than the chartered freight, the difference to be paid in cash prior to the ship's clearance at the Custom House . . . the liabilities of charterer's to cease on the vessel being loaded, the master having a lien on the cargo for all freight and demurrage under this charter-party." The charterers sub-chartered the ship. She was loaded with a cargo of oats for carriage from New Zealand to London, and a bill of lading for the cargo, under which freight was payable at per ton, was presented by the sub-charterer to the captain, by whom it was signed. There was a great shrinkage of the cargo during the voyage, so that the freight paid by the consignees was less than the sum that had been calculated at the port of loading, the difference between these two sums was £195 13s., which sum the owner sought to recover from the charterers. The difference between the sum calculated as freight according to the weight at the port of loading, and the chartered freight of £4,000, had been paid by the charterers before the steamer was cleared, according to the

terms of the charter-party. At the trial of the action before Mr. Justice Day without a jury, this learned judge decided that the charterers were liable for the £195 13s., and he gave judgment for the plaintiff. From this decision the defendants appealed. It was argued for the charterers, firstly, that the captain was entitled to refuse to sign the bill of lading unless the words "all other conditions as per charter-party," were added, and his negligence in not insisting on this right relieved the charterers; and secondly, that the charterers were relieved by the cesser clause from liability for anything occurring after the ship had been loaded. It was decided by the Court of Appeal, in affirming Mr. Justice Day's adjudication, that the captain's duty was to sign the bill of lading offered to him, and his doing so did not prejudice the right of the owners to recover the charter-party freight from the charterers, and also that, according to the rules laid down for the interpretation of a cesser clause by the appellate tribunal in the case of *Clink v. Radford* (84 Q. T. Rep., N.S., 491—1891), the charterers were not relieved by the cesser clause from their liability to pay the balance of freight sued for.—*Hansen v. Harrold Brothers.*

### Despatch Money as Set-off to a Claim for Freight.

The s.s. *Glendevon*, owned by the plaintiff, carried a cargo of 2,103 tons of coals belonging to the defendants, proprietors of the South Derwent Colliery, from Newcastle to Lisbon, under a charter-party which was dated November 17th, 1892, the essential parts of which stated that the "steamer was to be discharged at the rate of two hundred tons per day, weather permitting (Sundays and fête days excepted), according to the custom of the port of discharge, and if discharged to pay at the rate of 8s. 4d. per hour for every hour saved. . . Demurrage twenty pounds for every day's detention in discharging, and in same proportion for any part of such day over and above the days allowed as aforesaid, except in case of riot or any hands striking work, frost, snow or floods, or other accidents which may prevent the discharging of such steamer." The discharge of the ship was begun at 7 a.m. on December 2nd, and completed at 5 p.m. on December 7th, or (excluding Sunday, December 4th) in 106 hours; but the time allowed for the discharge was 252 hours, which, excluding December 8th, a fête day, and December 11th, a Sunday, would bring the time for discharge up to 7 p.m. on December 15th, and the plaintiff consequently credited the defendants with £260 16s. 8d. for 146 hours despatch. The defendants included the fête day and the Sunday, December 8th and 11th respectively, as also saved to the ship, amounting in all to 194 hours saved, and therefore they demanded a deduction from the balance of freight due to a further sum of £20 for 48 hours despatch. The Judge of the Newcastle County Court gave judgment for the plaintiff, because, as he held, the argument between the parties should be read as excluding Sundays and fête days from the estimation of despatch. It was decided by the Admiralty Court, in affirming this decision, that Sunday and fête days were excluded both in the compensation of the time allowed in discharging and in that of the time saved, therefore despatch money by way of set-off to a claim for freight was only payable by the plaintiffs to the defendants on the difference between the number of hours occupied by the defendants in the discharge and the total number of hours which the charter-party permitted them.—*The Glendevon.*

H.M.S. "Bruiser," the last of the new type of torpedo-boat destroyers supplied by Messrs. J. I. Thornycroft & Co., has lately been successfully launched at Chiswick, the naming ceremony being performed by Miss Barnaby, daughter of Mr. S. W. Barnaby, naval architect to Messrs. Thornycroft. The vessel is a sister ship to the *Boxer*, built and engined by the same firm, which recently, on her official trial, attained a speed of 29.17 knots. She is 200 ft. long, and has a beam of 19 ft. Her engines and boilers—to be fitted by her builders—will be of the same type as those supplied to the *Boxer*, and are guaranteed to give her a running speed of 27 knots. The armament of the *Bruiser* will comprise one 12-pounder and five 6-pounder quick-firing guns and two torpedo deck tubes.

Emperador Carlos Quinto.—On March 13th the Spanish turret-ship *Emperador Carlos Quinto* was successfully launched at Cadiz from the shipbuilding yard, Vea Murgina, belonging to Messrs. Noriega & Co., under the superintendence of Mr. Nicolau Fuster, naval architect of the Spanish Navy.



## NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from February 25th, to March 26th, 1895:—

Austin, F. W., engineer to the *Hearty*, to date February 27th.  
 Bench, George E., chief engineer to the *Hecla*, additional, to date March 13th.  
 Bills, W. W. (probationary), assistant engineer to the *Crescent*, to date March 12th.  
 Brown, T. F., assistant engineer to the *Victory*, supernumerary, to date February 15th.  
 Burnes, Thomas, fleet engineer to the *Agincourt*, to date March 6th.  
 Christian, T. W., engineer to the *Rainbow*.  
 Cocks, H. W. L., assistant engineer to the *Vivid*, supernumerary, to date February 11th.  
 Colquhoun, Peter, fleet engineer to the *Achilles*, to date March 16th.  
 Cook, W., staff engineer to the *Crescent*, to date March 12th.  
 Cooper, H., engineer to the *Retribution*, to date April 9th.  
 Cottam, F. M., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.  
 Crowle, J. N., engineer to the *Spider*, to date March 2nd.  
 Cudlip, Edwin W., engineer to the *Daring*, to date March 1st.  
 Duke, D. E., has been appointed assistant engineer for temporary service in Her Majesty's fleet.  
 Evans, H., assistant engineer to the *Rainbow*, to date March 5th.  
 Fleetwood, John L., engineer to the *Dreadnought*, to date March 16th.  
 Follett, Samuel G., staff engineer to the *Aurora*, to date March 16th.  
 Gallery, E., engineer to the *Orlando*, additional, to date February 23rd.  
 George, F. T., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.  
 Gilbert, W., engineer, has been placed on the Retired List, with permission to assume the rank of inspector of machinery, having attained the age for compulsory retirement.  
 Harding, Robert, staff engineer to the *Hibernia*, additional, to date March 13th.  
 Irish, H. W., engineer to Hong Kong Yard, to date February 28th.  
 Johnson, M. C., has been appointed assistant engineer for temporary service in Her Majesty's fleet.  
 Kingston, F. J., engineer to the *Hotspur*, to date March 6th.  
 Knapman, H. T., engineer to the *Fervent*, to date March 2nd.  
 Looch, H. J., staff engineer to the *Raleigh*, to date February 28th.  
 Mabb, W. J., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.  
 Mallinson, E. D., assistant engineer to the *Pembroke*, supernumerary, to date March 2nd.  
 Martell, R. W., engineer to the *Vernon*, to date March 18th.  
 Meaden, N., fleet engineer to the *Orlando*, additional, to date February 23rd.  
 Mitchell, George N. H., fleet engineer to the *Ajax*, to date March 6th.  
 Minhinick, P. C. (probationary), assistant engineer to the *Crescent*, to date March 12th.  
 M'Lean, H. C., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.  
 Murray, George W., engineer to the *Victory*, to date March 4th.  
 Paul, O. E., engineer to the *Conqueror*, to date March 7th.  
 Pearce, W. H., engineer to the *Rainbow*, to date March 5th.  
 Peel, H. W. C., engineer to the *Hunter*, to date March 2nd.  
 Pring, F., assistant engineer to the *Orlando*, additional, to date February 23rd.  
 Priston, E. B., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.  
 Ramsay, T. W. H., inspector of machinery to the *Orlando*, additional, to date February 23rd.  
 Reynolds, James A., engineer to the *Basilik*, to date March 6th.  
 Richards, T. W. (probationary), assistant engineer to the *Retribution*, to date April 9th.  
 Rose, G. J., staff engineer to the *Tyne*, to date March 6th.  
 Ryan, James, engineer to the *Ferret*, to date March 20th.

Smith, O. E., has been appointed assistant engineer for temporary service in Her Majesty's fleet.  
 Stevens, John G., chief engineer to the *Victory*, additional, to date March 13th.  
 Stuart, J. J., staff engineer to the *Orlando*, additional, to date February 23rd.  
 Sydenham, F. W., assistant engineer to the *Mohawk*, to date March 14th.  
 Teed, H. R., engineer to the *Partridge*, to date March 6th.  
 Thompson, F. D., engineer to the *Northampton*, to date February 27th.  
 Tuckwell, H. M. S. (probationary), assistant engineer to the *Victory*, supernumerary, to date March 1st.  
 Turner, H. J., engineer to the *Crescent*, to date March 12th.  
 Underhill, A. W. (probationary), assistant engineer to the *Crescent*, to date March 12th.  
 Whittingham, W., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.  
 Worth, Frederick, staff engineer to the *Dreadnought*, to date March 16th.

HOAR & BROWN'S HARDWOOD MARKET  
REPORT, MARCH 23st, 1895:

TRAK:	Timber Loads.	Planks Loads.	Blocks Loads.	Total Loads.
Stock 1st Mar.	5,600 ..	2,047 ..	91 ..	7,738
Landings	— ..	178 ..	— ..	178
	5,600 ..	2,225 ..	91 ..	7,916
Deliveries	382 ..	198 ..	— ..	560
Stock 20th Mar.	5,238 ..	2,027 ..	91 ..	7,356

There is very little movement either in logs or planks, and the deliveries have shrunk to very small figures. A busy time was anticipated after the breaking up of the long frost, but during the bad weather very few orders were booked, and any perceptible difference in the stock figures can scarcely be looked for until the supplies for the Admiralty are taken.

Large without reserve sales of planks are being held, with the promise of more to follow, which will no doubt result in a further fall in values. Deliveries from the docks are only of small extent.

MAHOGANY.—The market continues firm, and good prices are paid for prime logs. The minimum has also advanced another 5 per cent. both for Honduras and Cuba. Some cargoes are still being held for better figures, and an advance in values is confidently expected, provided African and Panama supplies are withheld to a reasonable extent. Both these latter qualities are coming forward in better condition and are finding increased favour, the price being greatly to the advantage of the consumer. A large quantity of Cuba wood has been delivered lately, leaving a firmer market.

CEDAR.—The trade in this wood is very inactive, the cigar box industry being unusually quiet, and stocks are increasing; but prices hold up.

KAWIRI PINE.—A fair business is in progress, and although prices fell a little lately, they are not expected to drop any further.

PADOUK.—No business of any importance to report.

GREENHEART.—A sluggish trade, the deliveries for some time having been very meagre.

SEQUOIA.—Positively nothing doing lately. Stocks consequently continue large.

BLACK WALNUT LOGS.—The stock consists of nothing but inferior qualities, which have been rather freely moved at low figures. Prime wood of large sizes is in great demand and would realize full prices.

AMERICAN LUMBER.—Any remarks as to one description are generally applicable to the whole. While there is a fair demand for the better descriptions of oak, walnut and whitewood, the lower qualities and culls, of which there are large stocks, can only be forced on the market at ruinous prices.

## INDUSTRIAL AND TRADE NOTES.

## THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

THE question of wages in the West of Scotland steel trade, to which reference was made in last month's Notes, has now been settled, and in a manner satisfactory to the best interests of the steel trade generally and of shipbuilding and marine engineering, as well as those of the men themselves. The Conciliation Board of the West of Scotland steel trade met in Glasgow on the 18th ult., and discussed the question in an amicable way. The men contended for arbitration on the question of a 5 per cent. reduction; but the employers held that if arbitration were resorted to, the question should be one of a 10 per cent. reduction. Eventually the men agreed to accept a reduction of 5 per cent. This result has occasioned satisfaction among steel makers and shipbuilders, as it will in some small measure help to increase the margin of profit on the work being contracted for, which margin in very truth has been infinitesimal for a long time, if not quite absent altogether.

While good results have apparently followed the appointment of the committee on the demarcation of work as between carpenters and joiners in shipbuilding operations, there are still seemingly loopholes for the escape of the spirit of envy and grievance which so persistently dominates these two classes of artisans. On the Tyne, according to the annual report of the Associated Shipwrights' Society just issued, the Committee's doings "prevent useless stoppages"—which is in itself something. On the Clyde, to all appearances, there is still a less satisfactory state of matters existing. The thin end of one of those disputes which have so often before culminated in insane struggles between these two classes is once more seen in the strike which took place in the yard of the London and Glasgow Shipbuilding Co., at Govan, on the 16th ult., and is still unsettled at the date of writing. About 150 carpenters—the whole force employed—struck on account of the manager giving the joiners a job which the carpenters contend belongs to their side of the demarcation line. The work in question—the fitting up of felt and wood cleading in a passage—had been held in abeyance for several days, as the job is apparently one of those which has been left by the Demarcation Committee to the employers for disposal. The shipwrights are convening meetings daily and seem determined to keep off work until their alleged rights and prerogatives in this special item of work are conceded them.

The orders placed with shipbuilders and engineering firms during March have not been very numerous, but the aggregate tonnage booked is considerable. Altogether some 25,000 tons, mostly of steam vessels, have been placed and more than compensates for the tonnage launched during the month which has been smaller than usual.

Messrs. Wm. Simons & Co., Renfrew, early in the month received from a London firm an order to construct a large and powerful hopper dredger for Plymouth, which will be employed in connection with the extensive improvements being carried out in that harbour. The dredger is specially designed for the removal of rock, and will have all the most modern appliances.

Messrs. Charles Connell & Co., Whiteinch, about mid-month contracted with Messrs. Bell Bros. & McLelland to build a steel screw steamer of 6,000 tons capacity. The machinery for these vessels will be supplied by Messrs. Dunsmuir & Jackson, of Govan.

Messrs. D. & W. Henderson, of Meadowside, Partick, have contracted with Messrs. Bell Bros. & McLelland for the construction of two steamers of about 6,000 tons each, similar to the 6,000 tonner above noticed as having been secured by Messrs. Connell & Co. All these three vessels, it may be stated, will be built to the rules and under the supervision of the British Corporation Registry. Messrs. Henderson are making considerable progress with the construction of the new America Cup challenger, *Valkyrie*. Almost all the frames have been set and it is expected the yacht will be launched next month.

Messrs. Blackwood & Gordon, engineers and shipbuilders, Port-Glasgow, whose patent hauling-up slip, since it was put into operation some months ago, has been largely requisitioned for ship repairs, overhaul and painting, have just contracted with the Ness Steam Shipping Co., Limited, of Inverness—through Messrs. Pollock & Co., naval architects and surveyors, 128,

Hope Street, Glasgow—to lengthen the company's paddle steamer, *New Undaunted*, and to fit her with new boilers, new masts and rigging, and give her a general overhaul. Messrs. Blackwood & Gordon have at present on their slip the screw tug steamer *Eagle*, having the repairs made to her hull, rendered necessary by her having been aground during the recent severe weather off the island of Arran; also the Clyde river steamer, *Elane*, being overhauled for the summer season. The *Vivid*, another of these river passenger steamers, has just left the slip, and in the course of the next few weeks the *Glen Sarmoz*, the crack steamer of the Caledonian Steam Packet Co.'s fleet, and one or two others will be taken on and similarly treated. In this connection it may be added that Bowling Harbour, where most of the large fleet of Clyde passenger steamers find winter quarters, is now almost depleted of its galaxy of Clyde "greyhounds," the cause being the usual spring overhaul prior to entering on the summer services.

It has been officially announced that the Right Hon. Sir William Marriott, has joined the Board of the Fairfield Shipbuilding and Engineering Co., Limited. He was formerly a prominent member of Parliament.

Messrs. Gourlay Bros. & Co., Dundee, have secured a contract to build for the India General Steam Navigation Co. a passenger steamer. The vessel will be about 1,000 tons register; built of steel, and fitted with twin screws. She will have large passenger accommodation both for British and native passengers, and will be employed in the coasting trade in India. The engines will be of 4,000 H.P., and calculated to propel the vessel at a speed of 18 knots per hour. The steamer will be constructed according to the highest requirements of the Board of Trade. Messrs. Gourlay will begin the building of the vessel immediately, and it is expected she will be ready for launching in about six months. Messrs. Gourlay Bros. have also secured through Mr. John P. Bruce, shipbroker, an order to build a powerful screw tug for a firm abroad. The vessel will be supplied with triple-expansion engines, and otherwise fitted for the special work for which she is intended.

Messrs. Hall, Russell & Co., Aberdeen, have contracted with a Liverpool firm to build two steel barges of about 300 tons capacity. They will be employed in the Brazilian coasting trade.

The Fairfield Co. launched on the 19th ult., the torpedo-boat destroyer *Handy*; the first of the three destroyers the company is building for the British Admiralty. The vessel should have been floated during February, but on the day fixed for the ceremony the river was blocked with ice, and the launch had to be postponed. The boat is an exceptionally fine specimen of her type, looking if anything smarter than any that have preceded her. One design with slight variations has certainly served for the whole fleet; but what restrictions there were have not prevented the Fairfield Co. from imparting something of its own style to the new boat. The *Handy* has only two funnels. The Birkenhead boats, it will be remembered, had four funnels, and the Clydebank trio, three funnel. In all the fast vessels built at Fairfield—excluding, of course, the *Normannia*—the practice has been to have the waste products of combustion going up only two funnels, no matter whether the boats are *Campanias*, cross-channel record breakers, or torpedo-boat destroyers. On trial the *Handy* is certain to at least maintain the reputation of the builders of the earliest and the latest ocean greyhounds. She is 194 ft. long, 19 ft. 4½ in. broad, and 5 ft. 7 in. draught. The engines are of the ordinary triple-expansion type. The Clydebank boats have Norman boilers, and the pair being constructed at Paisley, locomotive boilers; but two of the Fairfield boats, including the *Handy*, have the Thornycroft boiler, and one, the Babcock, a boiler whose performances is being watched at present with more than usual interest.

During the past six weeks or so, as many as six of these swift torpedo-boat destroyers have gone through their paces over the Clyde measured mile at Skelmorlie, which seems to be becoming more and more the area over which high-speed steamers of every class, emanating from shipyards all over the kingdom, must show their paces and satisfy contractors stipulations as to speed, turning power, etc. Two of these peculiarly constructed craft, the *Banshee* and the *Contest*, were the productions of Messrs. Laird Bros., a conspicuous feature being their four short funnels and low freeboard, which serves to accentuate if not give a sort of incongruous aspect to the great length of the vessels. Three others were the *Shark*, the *Rocket*, and the *Swirl* all built by Messrs. J. & G. Thomson, Limited, Clydebank. Though these

are about the same length as the Mersey-built boats, they are only fitted with three funnels. All have attained an average speed of 28 knots per hour on their official three hours' trial, equal to fully 32 miles per hour. In the case of the latter, indeed, the speed during the three hours' run was found to be 28.05 knots; revolutions, 405. The *Suri's* mean speed on six runs over the measured mile was 27.6 knots, the corresponding revolutions being 398.

The sixth torpedo-boat destroyer tried on the renowned stretch of water at Skelmorlie, was the *Sturgeon*, the production of the Naval Armaments Co., of Barrow, and the results in her case were even more remarkable than in any of the others. On the 21st ult., during a 2½ hours' run in a stormy waterway, she averaged 29 knots or nearly 34 miles per hour. This truly phenomenal speed was attained under conditions which were all against fast steaming. Half a gale blew from the south-west and heavy seas broke over the little boat as she sped down frith. While off Holy Isle, a heavy sea was shipped which filled the forward stokehold and put a stop to the official trial. The trials have been resumed, but up to time of writing the results have not been made known.

Messrs. Hannah, Donald & Wilson, of Paisley, have work well forward on the torpedo-boat destroyer they are constructing, and she will be launched in a day or two. She will be launched broadside into the river Cart.

Reverting to the subject of the suitability of the Clyde measured mile, it may be recalled that during the autumn of last year Messrs. Laird tested as many as four vessels on the Skelmorlie mile, viz: No. 97, first-class torpedo boat; the torpedo cruisers *Ferret* and *Lynx*, and the Argentine cruiser *Patria*. At Liverpool the measured mile is unsuited for these high speed vessels, while on the other hand, the course at Skelmorlie is well sheltered and exceptionally suited for securing trustworthy and uniform results. The water is deep—about forty fathoms—and the depth of water, it is generally conceded by experts, should not be less than from ten to fifteen times the draught of the vessel. If less than this the speed will be seriously interfered with. The Admiralty knot at Stokes Bay, from this cause is almost totally useless for vessels of deep draught or high speed. Attention having been drawn to this subject by Dr. (now, Sir) W. H. White at the Institution of Naval Architects two years ago, it is not surprising that the Admiralty should encourage the trials of vessels built north of the Thames taking place at Skelmorlie, and it may even become the standard testing ground for many of the naval vessels produced in the dockyards of the south.

Greenock people are seemingly resolved that the idea of having a Government graving dock constructed at Greenock shall not be lost sight of. The matter was discussed at a recent meeting of the Law and Finance Committee of the Local Harbour Trust, when it was agreed to meet with a committee of gentlemen interested in the question. It cannot be seriously disputed that, as pointed out in the course of the debate on the Naval Estimates in Parliament on the 18th ult.—there is here matter for some reform. Scotland is entirely left out of count when sites are proposed for permanent naval docks and arsenals. Why, should the West of Scotland not have a fair share of the permanent works which are contemplated? To mass these all on the South Coast of England might be a serious cause of weakness in the event of an outbreak of war, for it would retard unduly the running in and repairing of such vessels as were injured in conflict on the coasts. It is to be assumed that all attacks upon our "first line" are to be confined to the narrow stage of the English Channel?

Messrs. Hannan & Buchanan, Glasgow, the well-known makers of engine indicators, pressure gauges and other important engine-room accessories are busy as usual with their various specialities. One of these, the McKinnell & Buchanan Patent Indicator, which was introduced some three years ago and was at that time favourably noticed in these columns, is receiving extended adoption amongst the best steamship companies, who highly recommend it for simplicity and accuracy. One chief engineer of a large Atlantic liner writes to the makers as follows:—"I have taken diagrams on several occasions with McKinnell & Buchanan's Patent Indicator and have pleasure in stating that it has worked to perfection. I have tested the accuracy of this instrument by running the pencil over the card for twenty consecutive revolutions of the engines, and no deviation of the pencil was perceptible." One of these indicators was sent on approval at the request of a firm of gas engine makers, and the

fact that they retained it and ordered other three forms strong evidence that the instrument is suitable for gas as well as steam engines. Another speciality, in steady demand by engineers all over the Kingdom and abroad, is Buchanan's Patent Improved Pressure Gauge for high-pressure steam. The improvement—an almost indispensable one for high-pressure steam—prevents the gauge from getting damaged with steam, and insures its always working at an even temperature. It dispenses with the need for any drain cock or valves on syphon, the cock on the gauge being arranged to suit this purpose. By turning out the handle of cock the pressure is instantly released, the gauge hand falls back to zero, thereby showing it to be working. This arrangement is equally good for low pressure vacuum and compound gauges; in all of which the firm introduce another improvement in the form of a special make of the springs which form so essential a feature in these instruments. These are made of Delta metal and are finer in the grain, bear a greater strain without stretching, and in various ways are superior to the yellow brass springs usually fitted. With springs of the description fitted by the firm no difficulty is experienced in maintaining the accuracy of pressure vacuum and compound gauges even with the high pressure required for working the triple-expansion and other multi-expansion engines now common.

## THE TYNE, WEAR, TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

### THE TYNE.

**Shipbuilding.**—The depressing spectacle of fully one hundred idle steamers on the Tyne affords little hope of an early improvement in the demand for tonnage, and it is to be feared that for some months to come the present state of extreme slackness at a number of the yards must remain unchanged. Though prices are now probably lower than they have ever been in the history of the industry, being, it is stated, no more than £5 5s. per ton for ordinary cargo steamers, new orders are rarely heard of, and enquiries are, if anything, scarcer than in the first two months of the year. Such orders as have been placed this month are either on foreign account or for vessels intended to be placed on special services. Messrs. Wigham, Richardson & Co., for instance, have booked an order from the Hansa Co., of Bremen, for a steamer of 5,000 tons carrying capacity, to be fitted with quadruple-expansion engines at the works of the builders. It may be stated that the firm built a handsome steamer for the same company a few years ago. The firm have just launched a fine vessel named the *Hathor*, which has been built to the order of the Kosmos Co., of Hamburg, and they have a couple of other vessels in progress.

Messrs. Hawthorn, Leslie & Co. have received from Russian owners an order for two passenger steamers of similar size and design to the *Grand Duke Constantine* built by the firm for the same owners in 1892. As the firm have also an order for a large vessel intended for addition to the Russian Volunteer Fleet, besides three torpedo destroyers ordered by the Admiralty, the yard is likely to be kept fully going for a long time to come. At the adjoining yard of Messrs. R. Stephenson & Co. there is nothing on the stocks and no work in preparation; at the time of writing, however, an expectation exists that some work which is now being negotiated for will be secured, and the machinery again put in operation.

Messrs. Armstrong, Mitchell & Co. have been commissioned to build for Messrs. Samuel & Co., of London, two oil steamers of 7,000 tons carrying capacity each. It is understood that these vessels will embody some new features in construction, and besides having engines of exceptional power, will be fitted up in the most complete manner, with ventilating and lighting accessories, and the most approved appliances for loading and discharging cargo. In addition to this important order, the firm have a contract to build an immense pontoon, 75 ft. wide by over 200 ft. in length, which is to be used as a ferry for carrying trains across the river Volga. The design of the pontoon is quite novel, and it will, when completed, be among the most interesting specimens of naval architecture that has ever been turned out from an English shipyard. A powerful ice cutter is also ordered for the same destination, and the whole of the work



will be executed in the firm's Low Walker yard. The briskness noted a month ago at the Elswick yard, is fully maintained, and it is understood that besides the cruiser for which frame-turning was commenced in January, there are two others of the same type and size to be built in the yard. One of the torpedo destroyers, which the firm are building for the home Government, was launched early in the month, and the other is well advanced towards completion.

Operations at Messrs. C. S. Swan & Hunter's yard were temporarily stopped this month through one of these petty sectional strikes which are usually as objectless as they are annoying. It appears that less than a dozen men went on strike because of a misunderstanding which ought never to have taken place, and this perfectly inexcusable proceeding led to a stoppage—happily only for a few days—of the whole establishment. If trade unions are to be managed so clumsily and ineffectively as to be powerless to prevent such manifestations of disorderliness as this amongst their members, they will lose the best characteristic with which they have been up to the present credited, and will forfeit the good-will of their staunchest friends among the employers. A keel is now being placed in the west yard, which for some months past has been practically unoccupied. At Messrs. Dobson & Co.'s yard, the framing of a large vessel has been commenced, and two small ones that are on the stocks are nearly completed.

The Tyne Shipbuilding Co. have commenced the construction of a second large steamer ordered by local owners, and their yard now presents a very satisfactory appearance, as compared with the two other yards in the immediate vicinity. At the Palmer Co.'s yard, the first of three torpedo destroyers—the *Janus*—was launched on the 12th inst., and is now at the wharf getting her fittings completed. The firm have five vessels on the stocks, two of which are of exceptionally large tonnage. Two large steamers—the *Jaffa* and the *Hankow*—have recently arrived, and are now moored in the vicinity of the Jarrow yard. It is probable they are to be repaired; but to what extent is as yet unknown. At Messrs. Readhead's yard four berths are occupied with vessels in various stages of construction, and in the repairing department there is a good deal of work going on: It is announced that this firm have been commissioned by local owners to build a 5,000 ton steamer of special and somewhat novel type. A number of steam fishing vessels have been sold to Spanish owners lately, and as it is expected they will be replaced with larger ones, an impetus is likely to be given to business in certain yards where the building of such craft is a speciality.

**Engineering.**—At Messrs. Stephenson's foundry, Forth Street, Newcastle, two large castings, weighing about 20 tons each, were turned out in the first half of the month, and two others of equal size are to be completed shortly. They are to form the bed plates (two for each set of engines) of powerful duplicate engines now in course of construction at Messrs. Hawthorn, Leslie & Co.'s St. Peter's Works, for a Russian passenger vessel. No finer examples of ironfounding could be met with than these castings, which reflect the greatest credit upon the management of the department. In the locomotive department of Messrs. Stephenson's works business has improved, an order for engines on South American account having been received lately. The leading marine engine works keep fairly well employed, though in no case, excepting perhaps at the St. Peter's establishment, is there an abundance of work. Messrs. Baird & Barnsley, of North Shields, have been entrusted by the Tyne Commissioners with the order to build the engines for a new ferry steamer to ply between North and South Shields. This order, with the other contracts in hand, will cause the works to be pretty busy for some time to come. Messrs. Eltringham, of South Shields, are engaged in putting new boilers in the s.s. *Vindaballa*.

Messrs. John Spencer & Son's works at Newburn continue to be satisfactorily employed, especially in the steel rolling mills where boiler and ship plates of the very largest size are manufactured. The forge department at Ouseburn, is also kept going steadily. The Combination Metallic Packing Co., Lombard Street, Newcastle, have booked a fair number of orders since the opening of the year, and their works at Gateshead are kept in satisfactory operation. The company have amongst their customers, many of the foremost engineering firms in the kingdom, a circumstance which accounts for their having usually a full supply of work. Messrs. H. Watson & Sons, engineers and brass founders, Walker Gate, maintain a fair degree of briskness in their various departments, notwithstanding the depression in shipbuilding and other trades. At Messrs. Wm. Reid & Co.'s local

depot, 1, Akenside Hill, a steady business is being done in the sale of lubricators, reducing valves, and other specialities.

Messrs. Higginson & Co., of "Steam Quartermaster" fame, have established a branch of their business at No. 32, Side, Newcastle, under the management of Mr. E. Smith, a gentleman well known in Liverpool shipping circles. The firm are now introducing on the North-East Coast, wrought steel blocks of every description for use on ship-board, as also their special cargo blocks, for which there is likely to be a good demand.

Among recent orders obtained by Messrs. Noble & Lund, machine tool makers, Felling, is one for an exceptionally large radial drilling machine of their own special type, from Messrs. Wm. Doxford & Sons, Sunderland. They have also some other important work in hand for the same well-known shipbuilding and engineering firm.

The preservative composition for boilers known as "Zynkara," continues to have a large and extending sale, which, considering the dulness of the time, is a strong testimony to its worth.

#### THE WEAR.

**Shipbuilding.**—Messrs. J. L. Thompson & Sons, Limited, launched on the 9th inst., a finely designed passenger steamer for the regular service between the Tyne and Norway, and having been fitted with her machinery in the prompt manner characteristic of the Palmer's Hill Works, she is now receiving the finishing touches—which are of a most elaborate description—at the Manor's Quay. While on the stocks, the work of this vessel was greatly delayed by the long-continued bad weather; but notwithstanding this unlooked-for hindrance to progress, there is little reason to doubt that the vessel will be delivered to the owners in good time.

The yard of Messrs. Robert Thompson & Sons, Southwick, which has been inoperative some time, is about to be restarted, the firm having obtained an order for a vessel of between 3,000 and 4,000 tons carrying capacity. The keel blocks for the vessel have already been placed in position, and it is probable that frame turning will be commenced in the course of a few days. We understand the firm contemplate putting down new plant at their Bridge Dock, with a view to effect the docking and undocking of vessels in the shortest possible time. It may be added that the dock has been kept pretty constantly occupied during the past three months, and the resources of the establishment at the present moment, are being fully utilized. At Messrs. Pickersgill's yard a second steamer of over 3,000 tons carrying capacity ordered, it is said, by Hartlepool owners, has been laid down. The other vessel on the stocks is a sister ship for the same owners, and is now partly plated. Messrs. Doxford who have a considerable amount of work in hand, have commenced the system of "joggle" plating, in which they have secured proprietary right from Messrs. Bell & Rookliffe, the original patentees. A machine or "roller press" for "joggling" the edges of the plates, has been put down, and we can say from observation that it does its work effectively and with precision. The purpose of the invention is to enable shipbuilders to dispense with packing, by fitting outside as well as inside plates, close to the frames, beams, or other structural parts to which they are meant to be connected. The absence of packing tends to increase the lightness as well as the stability of the structure, and from the point of view of mere appearance the indented plating is without doubt a great improvement upon the flat plating now in general use. It admits of short rivets, where long ones had previously to be used (in the frame holes), and this also is a great advantage. The system which on the whole, seems to be a success, has been rendered possible by the ductility of the material from which ship plates are now manufactured; this quality rendering them capable of being indented cold, without any danger of fracture or damage.

Messrs. Austin & Co. have had a good deal of repair work lately, and it is understood that one of the vessels on the stocks has been sold to a local firm. At Mr. Laing's yard the outlook is far from bright, as the frame furnaces are inoperative, and there are no signs of any work in preparation. It is expected, however, that the building of a large vessel for which the frame material was received a year ago, will shortly be proceeded with.

**Engineering.**—In the marine engine works, the state of business is far from brisk, and considering the very limited amount of work in the hands of local shipbuilders, the prospect for the future is not reassuring. Messrs. Doxford have ordered through

the representatives of Messrs. Mirrlees, Watson, Yaryan & Co., of London and Glasgow, two "Yaryan" evaporators, for use in connection with the water-tube boilers to be fitted in "turret" ships now building in their yard. These, we are informed, are the first boilers of this type that have been adopted in the Mercantile Marine. It is expected that a third "Yaryan" evaporator will be ordered for use in another vessel which is also to be fitted with water-tube boilers, but the matter is not yet definitely settled.

At the Sunderland Forge there is a fair amount of work in progress, including stern frames, rudders, crank webs, &c. A recent addition which has been made to the machinery equipment of this establishment, is a powerful band saw for cutting iron and steel cold. The machine, which is one of Noble & Lund's special type, does the work of a slotting machine; but with greater quickness and precision, and its working in this particular instance has given the fullest satisfaction. At other forges business is slack and foundries are generally short of work. At the Monkwearmouth Iron Works, business is slightly better than in the early part of the year, and a larger proportion of the regular hands are employed. Brass and copper works are without exception showing a depressed state of business.

**The Hartlepoons.**—It is stated that Messrs. Furness, Withy & Co. have obtained an order from Messrs. Thos. Wilson & Sons, Hull, for a steamer of 3,000 tons carrying capacity. The other yards at this centre continue to have a fair show of work on the stocks. Work proceeds with the usual steadiness at the Central Marine Engine Works. Since the middle of February the following vessels, engined by Messrs. Thos. Richardson & Sons, Limited, have proceeded to sea after successful trial trips:—On February 21st the s.s. *Ailsa*, with engines having cylinders 23 in., 37½ in., 61½ in., by 39 in. stroke, and built by Messrs. Furness, Withy & Co. for Messrs. Lunn & Maccoy, of Newcastle. This is a fine cargo-boat, over 320 ft. in length, and has been specially designed for the heavy deadweight cargo trade. During the trial trip the engines worked in a most satisfactory manner, and a mean speed of 11 knots was obtained. The owners were represented by Mr. Maccoy, who expressed himself as highly satisfied with the performance of the ship and engines. On March 1st the s.s. *Steinberger* left Middlebro' Dock for a full speed trial of her machinery before proceeding to Antwerp to complete loading. This vessel has been built by Sir Raylton Dixon & Co., Middlebro', for the Hansa Steamship Co., of Bremen, and has a deadweight carrying capacity of about 5,500 tons. The engines, which are of the triple-expansion type, embody all the latest improvements, calculated to ensure the best results in the direction of economical working, as well as in effectiveness. The cylinders are 24½ in., 39 in., 67 in. by 45 in. stroke, steam being supplied by two extra large single-ended boilers, constructed to work at 180 lbs. pressure. A full-speed trial, lasting several hours, was made off the Yorkshire coast, during which steam was easily maintained and the engines worked to the complete satisfaction of the owners' representatives. The machinery in this instance was constructed under the supervision of Mr. D. Wulff, the company's superintendent engineer. On March 9th the s.s. *Ibez*, built by Messrs. Irvine & Co., of West Hartlepool, for Messrs. Jackson, Bros. & Cory, of Cardiff, ran a very successful trial trip from the Hartlepoons to the Tyne. The engines have cylinders 22 in., 35 in., 59 in., by 39 in. stroke, with two single-ended boilers working at 160 lbs. pressure. The machinery was constructed under the superintendence of Mr. W. Dunlin. During the past month the following vessels have received their machinery at the sheerlegs:—The s.s. *Benrath* and the s.s. *Benridge*, two sister ships, built by Messrs. Craig, Taylor & Co., of Stockton, for Joseph Houlst, Esq., of Liverpool, with engines 22½ in., 39 in., 62 in., by 42 in. stroke, and working at 200 lbs. pressure. The s.s. *Verbena*, built by Messrs. Furness, Withy & Co., for Messrs. J. Lilly & Co., West Hartlepool, with engines 22 in., 35 in., 59 in., by 39 in. stroke. The steel works are kept going pretty steadily, and local rope works show a continuance of moderately good business. Coal shipments at the docks show little or no improvement as compared with corresponding periods of former years, and business of other kinds is slack, the commencement of the timber importing season being yet a long way off.

**Stockton.**—The state of work at Messrs. Ropner & Co.'s yard is very satisfactory, thanks to the enterprise of the firm, who have managed to secure work at a time of exceptional scarcity, their main anxiety having apparently been, to keep the operatives employed. At the other establishments business is moderate.

Messrs. Blair & Co. continue to have a large number of hands employed. The works of Messrs. Rogers & Co., are kept tolerably brisk, and at Messrs. Riley Brothers' establishment, quite exceptional activity is maintained. The Stockton Forge Co. are fairly well employed in some departments, while in others the state of business is not particularly good. Bridge works are only doing a moderate business, and rolling mills are far from being fully employed. In other industries dulness very generally prevails, and the number of the unemployed at this centre is—despite the cessation of the frost—abnormally large.

**Middlebro'.**—Messrs. Raylton, Dixon & Co. have several vessels in various stages of construction on the stocks, and have also some repair work in hand. The firm have recently booked an order from Norwegian owners, for a steamer of 5,000 tons carrying capacity, and this came very opportunely, as otherwise the outlook would have been rather gloomy. Messrs. Craggs & Sons have secured an order for two barges of rather small dimensions; but the work on them will keep the machinery going for some time. Messrs. Harkess & Sons have been fairly well employed on repair work. Engine works at this centre are slack, and a similar state of matters is to be noticed at boiler and bridge works. There is a scarcity of orders at most steel works, but in one or two instances fairly good business exists.

**Consett.**—At the Consett Iron and Steel Works trade is in a fairly satisfactory state.

## THE MERSEY.

(From our own Correspondent.)

**T**HERE is still nothing of any weight coming forward in the way of new business, so far as shipbuilding and marine engineering in this district is concerned, and general engineers continue but indifferently employed, although the returns issued by the trades union organisations show some slight improvement, so far as the number of out-of-work members on the books is concerned. No appreciably increased activity is, however, reported in any branch of engineering throughout this district, and the spring season is opening with anything but hopeful prospects.

Messrs. Laird Brothers, of Birkenhead, are making satisfactory progress with the large line-of-battle ship, the *Mars*, for Her Majesty's Government, the first batch of armour-plates having been received on the premises, and some of them already fitted in place on the ship. The torpedo-boat destroyers recently completed by the firm, and to which reference was made last month, have undergone very successful trials. The sea-going qualities of these boats, the outcome of high-speed requirements for our Navy, are perhaps as interesting as the mere speed, and an illustration of their success in this direction has been afforded by the *Banshee* and *Contest*. The first, the *Banshee*, left Birkenhead on the Friday, and reached Greenock at three o'clock next morning, in spite of a heavy south-east gale, which prevailed from the Mull of Galloway onwards. The *Contest* left Birkenhead on Tuesday, at 7.15, and reached Greenock at 4.50 the same afternoon, giving an average of over 20 knots. Two days after, the *Banshee* went through her official trials, and came out creditably in every way, with a speed of 27.97 knots on the measured mile, and kept up for three hours' continuous steaming, 27.6 knots, or 33 statute miles per hour. Both these handy boats are now ready for service, although ordered only in February last year. The *Dragon*, which is the last of this lot, is almost ready for trial. Each boat is about 210 ft. long, 19½ ft. beam, and 4,500 H.P.

Further developments of the "Row" sectional tube as a water-heater, of which we gave a description when it was first brought out in Liverpool, have been introduced by J. J. Royle, of the Dalham Engineering Works, Manchester, who has taken up the manufacture of this very simple but effective heating appliance. As we have previously stated, the "Row" heating section consists simply of a circular tube indented in a regular manner, so that the indentations intersect each other at right angles, with the result that a liquid passing through the tube is thoroughly broken up and diverted into contact with a large amount of impinging surface, the effect being that the increased heating power thus secured is twice the efficiency of the plane tube surface. One of the latest applications of this tube is in the form of a steam kettle, very useful on board ship for boiling

water for the requirements of the crew, by the waste steam from the engine boilers. This kettle consists of a strong copper casing, tinned inside, and mounted upon a substantial iron stand, one or more "Row" heating sections being fitted inside, at the centre of the casing, and these sections being entirely submerged, are very effective in their action, one square foot of this tube being sufficient to raise 11 gallons of water from 43 deg. to 212 deg. Fahr. in 6 min. 20 secs., at a steam pressure of 62 lbs., as compared with 14 mins. with the same surface of plane heating tube.

The Manchester Ship Canal is making steady progress both in acquiring increased traffic and also in completing the requisite equipment of the docks, the most recent addition being a series of three-storey warehouses specially constructed for the accommodation of the large cargoes of cotton now going up to Manchester. These warehouses are throughout of fireproof construction, and are supplied with hydraulic power for hoisting, etc., whilst the lighting is entirely by electricity. With regard to the advantages of the three-storey sheds over the one storey designs first erected by the company, the former possess at least three times the storage space, and are adapted for handling the traffic in a much more expeditious manner, being supplied with all the necessary appliances. The buildings are connected together in pairs by means of a glazed roof, covering a loading way 250 ft. by 50 ft., and the warehouses on the quay-sides are fitted with steel sliding shutters throughout their entire length, so that the ship's cargo can be discharged at any point in the warehouse. A noticeable feature is the almost entire absence of cast-iron work, this being replaced by wrought steel. Each warehouse is 300 ft. long by 72 ft. wide, and 11 ft. from floor to floor. The bases of all the stanchions rest on blue brick footings, supported on concrete blocks, each 6 ft. square and 5 ft. deep, and, owing to the unstable nature of the ground, four wood piles, 12 inch square, were driven by means of steam pile drivers, about 20 ft. below each base. The stanchions are of wrought steel, those on the inside being built up with channels and plates, whilst the outside stanchions are braced with lattice bars only. The two upper floors are of cement concrete 7 in. thick with a face of rock asphalt  $\frac{1}{2}$  in. thick, the concrete being supported by steel joists. The main floor girders, which are of steel, are composed of a joist with plates rivetted to the top and bottom flanges, and the floors are provided with hatchways, fitted with steel fire-proof doors resting in cast-iron frames. Access to the upper floors is gained by circular iron staircases. The bottom floor is laid with Rochdale flags 4 in. thick, and the floor is about 3 ft. 6 in. above the quay level, thus allowing goods to be loaded on to or discharged from the lorries and railway trucks with great expedition and ease. The roofs over the warehouses are covered with slates supported on steel angle laths, and a continuous skylight about 6 ft. wide is placed along the ridge, whilst the steel roof principals are braced together with two rows of longitudinal and diagonal wind-bracing. The roof over the intermediate roadway is also supported on steel principals and framing, and being, as already stated, covered in with glass with a glazed screen end, an abundant supply of light comes to the loading way, and the inner sides of the warehouses. The gable ends, which are built of brick, rest on cement concrete footings, and each gable is provided with two doorways on each floor, and these are fitted with steel sliding shutters on continuous rails. Over the doorways on the top floor are teazles for lowering the goods from the upper floors on to the lorries when standing on the end roadways. The top floors are fitted on the quay-side with a series of hinged loading platforms, which when not in use can be raised to a vertical position, thus maintaining the full width of the quay for the manipulation of the portable, hydraulic cranes, &c. When a ship is discharging the goods for the top floor it can be lowered on to any one of these platforms and run inside the shed, and the goods are lowered from the floors on the roadway side by means of hydraulic hoists and a number of monkeys or movable carriages are provided which run on continuous girders, thus enabling the goods to be handled at any point. The warehouses have been carried out according to the designs of the engineer for the Ship Canal Co., by Mr. Edward Wood, Ocean Ironworks, Manchester, and Messrs. De Bergue & Co., Strangeways, Manchester.

A specially designed lathe of exceptionally large capacity has just been completed by Messrs. Hulse & Co., Salford, for dealing with heavy marine work, such as propellers, &c. This machine, which is a patent self-acting duplex break and pit lathe, and has been specially designed for a firm on the Continent, is

capable of operating on objects up to 12 or 13 ft. diameter by 4 ft. wide in the pit, 9 ft. diameter by 7 ft. wide in the break—over the baseplate when the pit is closed, and up to 4 ft. diameter by 10 ft. long between the centres. An inlaid plate traversable longitudinally for opening and closing the pit is fitted in the baseplate, along which a slide bed of the three-girder type with movable headstock is adjustable. A sliding carriage carrying a compound rest traverses the slide-bed, and transversely is of sufficient length for surfacing large objects admitted in the break. For turning objects in the break, and pit duplex front and back rests are provided mounted on short slide-beds capable of being placed parallel, or at any angle with the lathe centres. The fast headstock, which is very powerfully geared, having 80 changes of speed uniformly graduated carries a massive face-plate chuck with cast-steel jaws. For turning and boring, gearing, and the like, these tools may be simultaneously in operation, one on the boss, the other two on the periphery, and the self-actions are entirely self-contained leaving all clear for getting work in and out.

In the iron trade business during the month has been quiet with low prices ruling, some brands of pig-iron being weaker by about 6d. than they were last month, but with the close rather more business is reported at the bottom prices, and the tendency is towards firmness at these figures. Local brands do not now average more than 42s. 6d. less 2½, delivered Manchester, for foundry, with very little business doing, and forge numbers in so small enquiry as to be scarcely quotable. In districts brands, forge Lincolnshire showed a hardening up at the commencement of the month, with a considerable demand coming forward, but this has now fallen off, and only limited transactions are being put through, with prices not averaging more than 36s. for forge and 38s. for foundry Lincolnshire, and Derbyshire now quoted 42s. to 42s. 6d. net cash, delivered Manchester. Outside brands have during the month been offered very low, but good foundry Middlesbrough would now be difficult to obtain under 43s. 4d. net cash, delivered Manchester, with most sellers holding to 45s. 6d. for Eglinton and Glengarnock, and 47s. 6d. to 48s. for Gartsherrie net prompt cash, delivered at the Lancashire ports.

In the manufactured iron trade business continues very depressed, with forges on short time, and prices not now averaging more than £5 for Lancashire bars, and—except in special cases—for North Staffordshire qualities, with sheets ranging from £6 12s. 6d. to £6 15s. and £6 17s. 6d. The Hoop-makers' Association have reduced their rates for shipment 2s. 6d. per ton, these now being £5 12s. 6d. to £5 17s. 6d., whilst for home trade quotations remain at £5 15s. to £6 for random and special cut lengths respectively.

Only a slow business comes forward in the steel trade with low prices current, ordinary foundry hematites not now averaging more than 51s. to 51s. 6d., less 2½; steel billets, £4 to £4 5s. net cash, according to quality; steel boiler plates, £6 and delivered Manchester district.

In the metal market the month opened with a reduction of ½d. per lb. in copper tubes, owing to the fall in raw material, and this brought forward some increased enquiry, and moderate orders have been booked, although business is still only quiet. At the close of the month a further reduction of ½d. per lb. in copper and brass tubes has been made, list rates for delivery Manchester district being now as under:—solid drawn brass boiler tubes, 5½d.; solid drawn brass surface condenser tubes, 7d.; solid drawn copper tubes, 6½d.; brazed copper gas and steam tube, 6½d.; brazed brass gas tube, 6½d.; brass wire, 5d.; copper wire, 6d.; rolled brass, 4½d.; sheet brass, 5½d.; yellow metal bolts, 4½d.; condenser plates, 4½d.; out copper nails, 7½d. to 8½d. per lb. and copper bolts, £53 per ton.

The coal trade has shown a quietening down, with prices weakening, although not quotably lower. House-fire qualities are necessarily in lessened demand, owing to the milder weather, but quotations remain about as last given. Steam and forge coals are in but limited demand, with prices easier, 6s. to 6s. 6d., now becoming about the average at the pitmouth. Engine fuel is in fair request, but supplies are plentiful and prices are cut very low, 3s. 6d. and 4s. for common to 4s. 6d. and 5s. for better qualities being about the general pit prices.

In the shipping trade there has been rather more doing during the month, but any increased activity has now fallen off, with good ordinary steam coal delivered at the Garston Docks, or the High Level, Liverpool, not averaging above 8s. to 8s. 6d. per ton.

## NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

**Barrow.**—The condition of the shipbuilding and engineering trades of this district has not materially changed during the past month. Much activity has been maintained in all the departments of the Naval Construction and Armaments Co.'s yard, and with the large programme of work in hand this activity may be expected to continue for some time to come, but as the orders held are gradually, in the natural course of things, being worked out, and new orders are not coming to hand, the time must soon come when some of the initial departments of shipbuilding, such as pattern making, frame bending, plating, rivetting, &c., will be short of work. In that view it is becoming necessary to look out for new work, but there is very little new tonnage on offer. Some enquiries, however, are being made for steamers for the Mercantile Marine, but great competition is experienced, and builders have only a chance with the best classes of work, as cheaper vessels invariably gravitate to the East Coast. The building of ocean tramps on the West Coast is the exception to the general rule. Anticipations have been indulged in that with the present low quotations per ton, shipowners would be led to speculate to cover immediate future requirements, but they have been deterred from doing much in that direction by the fact that so much shipping is now lying up idle, and until there are hopes of better trade in shipping it seems likely that new orders will not be plentiful. There is some reason to expect, however, that when capital is to hand shipowners will gradually possess themselves of steamers with economic engine power, in order that when the shipping trade does revive they will be able to compete on favourable terms with the modern type of steamer. It is much to be feared that many of the old type of steamers, will either have to be modernised by being tripled or improved off the face of the earth and be capitalised in the form of scrap. The Barrow builders have been so successful in all the work they have done for the Admiralty that hopes are entertained of securing a portion of the contracts offering in the new naval programme. Not much work is being given out by the Admiralty this year, and it will not represent much business for private yards except in the case of the three first-class cruisers, which are to be built out of the Dockyards. It is shown in the blue book returns that the Barrow Co. has made greater progress with the building of the *Powerful* than has been made by the builders of the *Terrible*, and it is also noticeable that more progress has been made with the building of the second-class cruisers *Juno* and *Doris* than that made by other firms engaged in the construction of this class of vessel. Further than this, the three torpedo-boat destroyers building at Barrow, the *Sturgeon*, *Starfish*, and *Skate*, bid fair to be amongst the fastest craft afloat either in the Navy or outside of it. In a preliminary trial, the *Sturgeon* steamed 27.86 knots, the mean revolutions of her engines being 401, the vacuum, 27 in., and the mean air pressure 2½ in. In a second trial she steamed practically 29 knots for 2½ hours in half a gale of wind and in a most choppy sea. These boats are frail-looking craft in which everything is sacrificed to lightness of construction for the sake of securing speed. In this respect the *Sturgeon* can be regarded as a phenomenal success, and her performances will be maintained by the two other Barrow "flyers," *Starfish* and *Skate*. The *Powerful* will probably not be launched until autumn, but her hull is very well forward, and the work of sheathing her with teak is proceeding admirably in the hands of the shipwrights. A strike of the latter took place during the month which fortunately was of short duration. Two London caulkers were put on to caulk the timbers of the *Powerful*, and four hundred shipwrights struck work because these men were not members of their society. A question arose as to the amount of work which ought to be done at caulking in a working day, and it was reported the London caulkers could manage to do about 60 lineal feet, as against the shipwrights 15 to 20 ft. The men returned to work after about a week's holiday, on the understanding that each would do a fair day's work without any test restrictions, and the two London caulkers were sent away. For sometime past there has been almost complete harmony between the masters and men at Barrow—a most fortunate thing considering how badly off some firms are for orders, and certainly a good thing for the work in hand, and the rapidity with which it has been got through. Much attention is now being devoted to the work of constructing the great sand-pump dredger at the Barrow Yard for the Mersey Harbour and Dock

Board. In some respects this dredger is an improvement on the *Brancaster* built at the same yard, which has already done such good work in the dredging operations on the Mersey Bar, and good progress has also been made with the twin-screw steamer *Duke of Lancaster*, building at Barrow for the London and North Western and Lancashire, and Yorkshire Railway Co.'s, Fleetwood and Belfast service of steamers. This steamer will be delivered at midsummer, although the order has only been in hand about four months. It is a remarkable fact, showing the effect of the introduction of the triple-expansion engine, that the steamers *Duke of Connaught*, *Earl of Ulster*, and *Prince of Wales*, built at Barrow for the Fleetwood service only the teens of years ago, are now practically out of date; twin-screw steamers are now all the rage, as they are found to be more easily and more cheaply worked, as well as much smarter on the service. The old type of paddle steamer is going out of fashion for channel services. Three steamers were launched at Barrow during the month—the H.M.S. *Skate*, the London County Council steamer *Burns*, named as a compliment to Mr. John Burns, M.P., and a small dredger for the Kingston Harbour. It is noteworthy in connection with the latter that on the day after her launch steam was got up and she steamed away to her destination. In the case of the s.s. *Burns*, her engines and boilers were fired in less than a week after the launch, and she went satisfactorily through her dock trials. The engines of H.M.S. *Majestic* have been delivered complete at Portsmouth, where the employees of the Barrow Co. are now busily engaged in fixing them in this newly-launched line-of-battle ship. Several structural alterations are being made in the Barrow and Douglas steamer *Manx Queen*. Improvements are being made in her saloons and in her hold generally, and the Naval Construction and Armaments Co. are providing her with new boilers and overhauling her engines. The *Manx Queen* will take her station on the Isle of Man service in the summer, when she is expected to steam at an accelerated rate of speed.

**West Cumberland.**—The shipbuilding trade in West Cumberland is steady, but not describable as active. The only two yards working are those at Workington and at Maryport. At Whitehaven nothing is doing. During the month Messrs. Williamson & Son, Workington, launched a four-masted barque classed A1 at Lloyd's, and built of steel throughout, with steel masts. Her length is 296 ft., breadth, 46 ft.; depth of hold, 27 ft. 5 in.; registered tonnage, 2,800; gross tonnage, 2,950; deadweight, 4,560 tons. Another ship will be put down on the same stocks.

**Shipbuilding Material.**—There is not a brisk demand for shipbuilding material, and for about a month past the mills at Barrow have been at a standstill. This, however, has not been owing to any scarcity of orders, but on account of a disagreement between masters and men as to the extent of a proposed reduction in wages. The difficulty has been referred to Mr. Jeremiah Head, of Middlesbrough, as arbitrator. In the meantime, the mills will start work on April 1st pending the award being received. Orders are held at Barrow for about 8,000 tons of plates and it is expected new work will follow both for Admiralty and general requirements. Ordinary ships' plates are quoted at £47s. 6d. The balance sheet of the Barrow Steel Co. shows a loss of upwards of £25,000 on last year's working. Changes are likely to be made which will lead to an improvement in the company's position. A new plate mill recently erected is ready for starting. This will tend to the economic production of plates, as it will be able not only to deal with thin plates, leaving the heavier mill for heavier plates, but will be able to utilise the outtings from the old mill and convert them into merchantable goods.

**The Hematite Trade.**—This trade is still depressed and even with only twenty-six furnaces in blast it is found that stocks of pig iron are increasing at the rate of the weekly output of three furnaces. Prices are easy at 42s. 6d. net cash, seller's warrants, and 42s. 5d. buyer's, while makers quote 43s. to 44s. per ton net, f.o.b., for mixed Bessemer numbers. Prospects in the hematite trade are not considered cheerful, and makers have not much hope till there is a brisker demand for steel both of Bessemer and Siemens-Martin's qualities.

**Important Find of Iron Ore.**—The Barrow Steel Co. has discovered a new deposit of iron ore at Park Mines which gives promise to be very extensive. The quality is of the highest, analysing 58 per cent. of metal and only 8 per cent. of silica or insoluble constituents. This class of ore is that from which the very best steel can be made, and therefore the find is of importance to Barrow as a centre for the manufacture of steel-making material and for the building of ships. The Duke of Devonshire, who is

chairman of the Barrow Steel Co., is the royalty owner at Park, and the new ore can be delivered at the Barrow works at 8s. compared with 13s. 6d., the present value per ton of equally good ore.

## BELFAST TRADE NOTES.

(From our own Correspondent.)

THE month now drawing to a close has been a busy one as far as shipbuilding and engineering is concerned, the firms taking advantage of the good weather to make up for lost time. The yards here have all enough work on hand to keep them going for fully nine months, and as regards new tonnage numerous enquiries are being made, and one or two very important contracts signed since last report.

Messrs. Harland & Wolff, Limited, have the s.s. *Oriana* almost ready for sea, and she will have had her trial by the time this reaches our readers' hands.

They also have the Warren liner *Scotsman* well in hand now. She was launched last December, but her engines and boilers were not ready owing to the fact that Messrs. Harland and Wolff are very busy in their engine shop at present, the twin engines of H.M.S. *Hannibal* at present building at Pembroke being in hand, and about which I propose to say more in a few months.

The *Scotsman's* machinery is now on board, and she is being pushed on rapidly. She will probably be ready for sea about May 1st.

The *Germanic* is now out of dock, and is getting her machinery in at the sheerlegs.

Messrs. Harland & Wolff have also the s.s. *Lord Bangor* of the Lord Line at present in for repairs.

Messrs. Workman, Clark & Co., Limited, delivered the s.s. *Mount Sirion* to her owners during the month, after a very successful trial in the Lough, she having attained a speed of 11½ knots per hour. The *Mount Sirion* has been built to the order of Messrs. Smith & Service, of Glasgow, and is 3,250 tons gross register.

The s.s. *Star of New Zealand* had her trial on the 21st of the month. She is a very fine specimen of a modern cargo boat, being built with the object of carrying a large deadweight cargo, and at the same time to maintain a good sea speed.

That the builders have succeeded in fulfilling the conditions of the contract would be a mild phrase to use in this instance, for at the trial she proved herself a very smart boat in every respect, and attained a speed of 13 knots per hour.

The builders were frequently complimented on their skill, and the *Star of New Zealand* is sure to do Messrs. Workman, Clark & Co. credit wherever she may go. She was built to the order of J. P. Corry & Co., Belfast and London, and proceeded to Cardiff on the 21st to load bunker, after which she proceeds to London to load a general cargo for New Zealand.

Messrs. Workman, Clark & Co. had the s.s. *Auric* in for general overhaul.

Since last month Messrs. Harland & Wolff received instructions from the West India & Pacific Steamship Co. to build for them two 8,000 ton steamers. The dimensions are not fixed yet, but probably will be 500 ft. by 53 ft. by 35 ft. The second of these two boats is not to be delivered for eighteen months.

This eminent firm seem to always get the greater share of any new tonnage of any importance that is wanted, doubtless due to the quality of the work they turn out; the work at present on hand, together with orders received, amounts to about 70,600 tons, a pretty handsome figure for these times.

Messrs. Victor Coates & Co., Limited, still continue busy. They had the s.s. *Theme* on her trial at the end of last month. This was in every way satisfactory, the speed being 11½ knots per hour. She immediately after proceeded to Troon to load coal.

At the beginning of the month Messrs. Coates received an order for a large triple-expansion engine of their own special design, from Messrs. A. & A. Crompton & Co., Limited, of Shaw, near Oldham; the cylinders will be 20 in., 31 in., and 50 in. by 4 ft. stroke, the working pressure being 160 lbs.

**The Institution of Junior Engineers.**—On Saturday, 23rd February, a very large number of the members of this Institution availed themselves of the opportunity kindly afforded by the President, Mr. Alexander Siemens, for visiting Messrs. Siemens Brothers & Co.'s manufactory at Woolwich. Special arrangements had been made for their guidance over the extensive works, which cover an area of 7½ acres, and the occasion was rendered exceedingly interesting in every way. The new and old dynamo shops, the milling, bobbin, fitters' and rubber shops; the central power and lighting station (all the machinery is driven by electric motors), the switchboard erecting room, the cable shop, tank-houses, lead cable shop, cable-testing, instrument calibrating, and show-rooms were seen. At the conclusion of the inspection the members were hospitably received by the President, who expressed the pleasure he felt in meeting them, and the chairman, Mr. H. J. Young, conveyed the thanks of the Institution for the facilities extended in connection with the visit.

**The Testing of Materials.**—A lecture was delivered last month by Mr. A. S. E. Ackermann, A.M.I.C.E., before the Civil and Mechanical Engineers' Society, on "Testing Machines and the Testing of Materials." The lecturer entered fully into the principles governing many of the various and well-known testing machines, and pointed out the good qualities, faults and difficulties of working with them. Various methods of gripping and holding the specimens to be operated upon were described. This was followed by details being given of the proper method of shaping the specimens, and of measuring and recording the results obtained, and the instruments used for this purpose, particular attention being drawn to the several extensometers, particularly those of Professor Unwin. Explanation was given of certain laws that it was well those making tests should bear in mind in working out results. The lecture was well illustrated by samples of metals and woods that had been tested; these were kindly lent by the authorities of the City and Guilds of London Institute and Mr. E. H. G. Brewster, C.E., M.I.M.E., who lent samples of steel boiler plates that had been tested by him in connection with boilers of his design. The peculiarities exhibited by some of the metals was very marked, and were prominently brought to the notice of those present. The necessity for testing materials was fully brought out in a discussion which took place towards the close of the meeting, at the invitation of the lecturer. A vote of thanks closed a very interesting meeting.

**Ship Railways for Warships.**—A certain newspaper which has the distinction of being edited by a lady—at least, so I judge from the fact that all letters published in its columns commence "Madame"—has given publicity to one of the most extraordinary ideas yet put forward. It is neither more nor less than a ship railway across France, to save the passage through the Straits of Gibraltar for vessels proceeding, say, from Marseilles to Bordeaux. That communication between these ports would be of immense strategic importance is abundantly clear. That it would be an advantage to the French commensurate with that which Germany will derive from the Balic Canal (about which I hope to speak next month) is obvious. But that warships can be carried by railway at the full speed of express trains is, as things stand at present—well, unlikely. This fact has been pointed out mildly by a correspondent of the paper. The original writer replies with a burst of indignation at the obtuseness of one who could suggest difficulties here. He says that the ships could be fought on the rails either singly or in a company. This allegation has only to be stated in these columns for each reader to answer it in his own mind. Then the writer goes on—"The men belonging to the vessel could, in the course of a few hours, throw up a curtain or mask of earth in front of it that would render it as secure and formidable as a permanent fortification"—and so on. It is possible that either the lady editor or the writer can be so hopelessly ignorant of the underwater dimensions of a warship? A battleship is not only some 350 ft. to 400 ft. long, but she has some 23 ft. of unarmoured side below her belt. Then there is the height of the railway truck. The curtain that the crew would have "to throw up in a few hours" would have to be then at least 30 ft. high and thick enough at the top to resist the heavy projectiles now used. Comment is needless here, but the ridiculous *impasse* that the suggested "curtain" brings us to is probably a fair criterion of the value of the suggestion that warships of the largest size should be conveyed at express speed by rail.



# LAUNCHES AND TRIAL TRIPS.

## LAUNCHES.—ENGLISH.

**Mogul.**—On Monday, February 25th, Sir Raylton Dixon & Co., Middlesbrough, launched from Cleveland Dockyard a very handsome steel screw steamer of about 5,500 tons deadweight carrying capacity, built to the order of the Mogul Steamship Co., of which Messrs. Gellatly, Hankey, Sewell & Co., of London, are managers, and intended for the China tea trade. The vessel will take Lloyd's highest class, and has been built under special survey to their three-decked rule. Her dimensions are:—372 ft., by 45 ft. 6 in., by 28 ft. 4 in. The upper decks are all of teak, and the vessel is specially fitted in every way for the Eastern trade. The accommodation is all arranged on the upper deck with a charthouse and captain's room on bridge deck, and the crew in topgallant fore-castle. The vessel will be fitted with six steam winches, powerful steam steering gear amidships, and every modern appliance, including Sidgwick's patent hinged topmast. Triple-expansion engines will be supplied by Messrs. The Wallsend Slipway and Engineering Co., Limited., Newcastle-on-Tyne, with cylinders 27 in., 44 in., and 72 in., by 48 in. stroke, provided with steam by two single-ended boilers, 15 ft. by 11 ft. 8 in., working at 170 lbs. pressure, and fitted with Howden's system of forced draught. The vessel is built on fine lines and handsome model, so as to attain a good rate of speed. The hull and machinery have been constructed under the supervision of Mr. F. Edwards, 62, Bishopsgate Street Within, London, the owners' consulting engineer. The christening ceremony was gracefully performed by Mrs. Kennedy, of Saltburn, who named the vessel *Mogul*. Sir Raylton Dixon & Co. have a sister vessel on the stocks for the same owners.

**Hawaby.**—On February 25th Messrs. Ropner & Son, of Stockton, launched a steel screw steamer of the following dimensions:—Length, over all, 290 ft.; breadth, 40 ft.; depth, 18 ft. 6 in., which they have built for a West Hartlepool firm. The steamer is built off the part awning deck rule, having poop and raised quarter deck, her deadweight carrying capacity being 3,000 tons on 17 ft. 6 in. The saloon and cabins for the captain and officers are fitted in the poop, whilst the engineers are accommodated in iron houses placed on the awning deck near the entrance to the engine room. She is built on the web frame principle, leaving the holds entirely clear for cargo, and carries her water ballast in a cellular bottom, and in the after peak. All labour-saving appliances are fitted for the economical working of the steamer, and also for the expeditious loading and unloading of cargoes. She has steam steering gear amidships, and screw gear aft, four powerful steam winches, two large donkey boilers, working at the same pressure as the main boilers, patent windlass, stockless anchors, &c. The engines will work up to about 800 effective H.P., and are by Messrs. Blair & Co. Limited. They are of the triple-expansion type, having cylinders 21 in., 34 in., and 56 in., by 36 in., steam being supplied by two large steel boilers, working at 160 lbs. pressure. The name of the steamer is the *Hawaby*, the christening ceremony being neatly performed by Miss Ropner, of Preston Hall.

**Possidon.**—On February 25th there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, West Docks, South Shields, a steel screw steamer, built to the order of Messrs. Stathatos Brothers, Ibrail. Her dimensions are as follows:—Length, 300 ft.; breadth, 41 ft.; and depth, moulded, 20 ft. 10 in. She is classed 100 A1 at Lloyd's, and has a carrying capacity of 3,750 tons deadweight. The vessel is built with a raised quarter deck, and partial awning deck forward, with topgallant fore-castle; has cellular double bottom fore and aft, and also deep hold tank in after hold, available for cargo. She is specially designed for grain cargoes, having extra bulkheads, &c. Her engines, which are also supplied by Messrs. John Readhead & Sons, are of the triple-expansion type, having cylinders 25 in., 37½ in., and 61½ in., by 42 in. stroke; working at a pressure of 160 lbs. per square inch, steam being supplied by two steel boilers. The vessel has been built under the superintendence of Mr. J. W. Donovan, of Sunderland, and Captain Caravias, and is the sixth vessel built for the same owners by the above firm. As she left the ways the vessel was named the *Possidon*, by Mrs. James Readhead.

**Hather.**—On Tuesday, February 26th, Messrs. Wigham Richardson & Co. launched from their Neptune Shipyard, New-

castle-on-Tyne, a handsome steel screw steamer, which they are building to the order of the Deutsche Dampfschiffahrts Gesellschaft "Kosmos," of Hamburg. The steamer is a sister ship of the s.s. *Luxor*, she is 350 ft. in length, by 44½ ft. beam, and will have well-finished accommodation for a number of passengers and for emigrants. The engines and boilers are also being constructed by Messrs. Wigham Richardson & Co., the former being of the builders' well-known type of four-crank quadruple expansion engines. They are the third set of this type supplied to the "Kosmos" Co., this and the preceding set embodying also the system of balancing patented by Mr. Schlick, of Hamburg, and introduced into the United Kingdom and developed by Messrs. Wigham Richardson & Co. The christening ceremony was gracefully performed in the presence of the owners and builders by Mrs. Jensen, the vessel being named the *Hather*.

**Benridge.**—On Tuesday afternoon, February 26th, Messrs. Craig, Taylor & Co. launched from their Thornaby Shipbuilding Yard a sister ship to the *Benrath*, which they recently launched. The dimensions are:—342 ft. by 43 ft., by 29 ft. 9 in. She is built of steel to the spar-deck rule, Lloyd's highest class, and has full poop, bridge and topgallant fore-castle. She will be fitted with six large steam winches and patent steam steering gear by R. Roger & Co., multitubular donkey-boiler by T. Sudron & Co., Limited, direct-acting steam windlass, by Emerson, Walker & Thompson Bros., Limited, patent fresh-water condenser by O. M. Row & Co., and all modern improvements. One of her special features is the large quantity of water ballast, being fitted with tanks to carry about 1,250 tons. In addition to the ordinary cellular bottom, the vessel is fitted with a deep tank abaft the engine-room, which can be utilised either for carrying water ballast, or any description of cargo, being fitted with large hatches, also a special system of ventilation, so as to obviate the difficulty so frequently occurring in those deep tanks. The vessel is rigged as a two-masted schooner, with telescopic masts, and carries about 5,600 tons deadweight, with large cubical capacity. The engines and boilers, which are being constructed for a working pressure of 200 lbs., are built by Messrs. Thomas Richardson & Sons, Limited, Hartlepool. This vessel, which has been built to the order of Joseph Houlst, Esq., of Liverpool, and under the superintendence of A. C. Hay, Esq., is the fourth built by these builders for the same owner. The ceremony of christening the vessel the *Benridge* was very gracefully performed by Mrs. Houlst, the wife of the owner.

**Hastingden.**—On Tuesday, February 26th, Messrs. William Gray & Co., Limited, launched a fine steel screw steamer of the following dimensions, viz.:—Length, over all, 280 ft.; breadth, 37 ft.; and depth, 20 ft. She has been built to the order of Messrs. Murrell & Yeoman, of West Hartlepool, and will take Lloyd's highest class. The deck erections consist of poop, raised quarter-deck, long bridge and topgallant fore-castle. A handsome saloon, state-room and accommodation for captain and officers will be fitted up in the poop, and comfortable quarters for the engineers at the after end of the bridge, and for the crew in the fore end of the bridge. The hull is built with web frames, a double bottom is fitted under each hold for water ballast, and there is also a large ballast tank in the after peak. Four steam winches, donkey boiler, steam steering gear amidships, screw steering gear aft, patent windlass, schooner rig, boats on beams overhead, and all modern appliances will be fitted. The engines are of the triple-expansion type working on three cranks. They are supplied by the Central Marine Engine Works of Messrs. William Gray & Co., Limited. The cylinders are 20 in., 31½ in., and 53 in. diameter, and the piston stroke 36 in. The boilers, built of steel, are of large size and will give an ample supply of steam at a working pressure of 160 lbs. per square inch. The ceremony of naming the ship *Hastingden* was gracefully performed by Mrs. Harrison, wife of Councillor Harrison, of Hartlepool.

**Elizabeth.**—On February 27th there was launched by Mr. R. Dunston, at Thorne, an English oak carvel-built keel, suitable for the general trade. The vessel is 62 ft. over all, 7 ft. 8 in. high, and has a 15 ft. 8 in. beam. She was named the *Elizabeth*.

**Aldernay.**—On February 27th, an iron steam ketch, of about 138 tons, named the *Aldernay*, was launched at Hull, owned by the Hull Steam Fishing and Ice Co., Limited, Hull.

**Emperor.**—On February 28th Messrs. Cochran & Cooper launched from their yard, Grovehill, Beverley, an iron steam trawler, 93 ft. by 20 ft. 6 in. by 11 ft. depth of hold, which will be fitted with 40 N.H.P. triple-expansion engines, by Messrs. C. D. Holmes & Co., Hull, and on leaving the ways was named the *Emperor* by Mrs. Connor, of Beverley. The above vessel has been built to the order of the Anchor Steam Fishing Co., Limited, Grimsby, and will be fitted up with all the latest improvements for deep-sea trawling.

**Forest Abbey.**—On February 28th this turret-deck steamer was launched from the yard of Messrs. William Doxford & Sons, Limited, of Sunderland, having been built to the order of Mr. Henry Sherwood for the Forest Oak Steamship Co., Limited, Newcastle. She will receive the highest class in both the British Corporation and Bureau Veritas registries. The christening ceremony was gracefully performed by Mrs. J. D. Farquharson.

**Corea.**—On March 9th Messrs. Earle's Shipbuilding and Engineering Co., Limited, Hull, launched the s.s. *Corea*, a steel screw steamer built by them for the Bennett Steamship Co., Limited, of Goole, for their service between the latter port and Boulogne. She is 210 ft. long, 31 ft. beam, and 18 ft. 8 in. depth of hold, is built to Lloyd's 100 A1 class, with raised quarter-deck, bridge, and fore-castle, is schooner-rigged, and is fitted with powerful cargo appliances and large hatchways. There is accommodation amidships for captain and twelve passengers, aft for officers, and in fore-castle for crew. The engines are triple-compound with cylinders 19 in., 32 in. and 52 in. diameter, by 36 in. stroke, the boilers being two in number and made for 160 lbs. working pressure.

**Burns.**—On March 9th the Naval Construction and Armaments Co. launched, at Barrow, the sixth steamer they have built for the London County Council. The steamer was named *Burns*, in compliment to Mr. John Burns, M.P. The five steamers already built are the *Baselgette*, *Belvedere*, *Binnie*, *Barking*, and *Barrow*. These vessels carry London sewage sludge out to sea, and are constructed to carry 1,000 tons each. They are driven by two sets of triple-expansion engines of 1,000 I.H.P., capable of propelling the ship at a speed of 10½ knots an hour, fully loaded.

**Vega.**—On March 9th the new steamer *Vega*, built for one of the largest steamship companies in Norway, the Bergenske Damskibsselskab, was launched by Messrs. J. L. Thompson & Sons, at Sunderland. The steamer is constructed on the spar-deck plan, and the principal dimensions are:—Length, 233 ft.; breadth, 32 ft.; depth, 23 ft. 4 in. She has been built to take the highest possible class with Lloyd's for passenger service. Her engines will be fitted by Mr. John Dickinson. The vessel will be completed in time for the Norwegian tourist season, and will be at once placed on the regular mail and passenger service between the Tyne and Bergen, in which route the Bergenske and Nordenfjeldske Co.'s have departures three times weekly.

**H.M.S. Handy.**—On March 9th H.M.S. *Handy*, the first of the three torpedo-boat destroyers which the Fairfield Co. are building for the Admiralty, was launched. The boat is an exceptionally fine specimen of her type, looking, if anything, smarter than any that have preceded her. One design with slight variations has certainly served for the whole fleet, but what restrictions there were have not prevented the Fairfield Co. from imparting something of its own style to the new boat. On trial she is certain to at least maintain the reputation of the outlanders of the earliest and the latest ocean greyhounds. She is 194 ft. long, 19 ft. 4½ in. broad, and 5 ft. 7 in. draught. The engines are of the ordinary triple-expansion type. Two of the Fairfield boats, including the *Handy*, have the Thornycroft boiler, and one has the Babcock & Wilcox, a boiler whose performance is being watched at present with more than usual interest.

**Volage.**—On Monday afternoon, March 11th, Messrs. Richardson, Druke & Co. launched from their building-yard a fine steel screw steamer of the following dimensions, viz., length over all, 325 ft.; breadth extreme, 42 ft. 10 in.; depth, moulded, 20 ft. 11 in.; tonnage gross about 2,700 tons. This vessel, which has been built to the order of Messrs. Christie & Co., Cardiff, will class 100 A1 at Lloyd's, and has been built under special survey. She has a break poop, quarter-deck and a part awning deck extending from mainmast to stem. Accommodation for captain and officers is provided in poop, engi-

neers in 'tween decks amidships, and crew forward. A cellular double bottom is fitted for water ballast, and an extra large after-peak tank. The equipment includes stockless anchors, four steam winches, steam windlass, large donkey boiler, steam steering gear, &c. The engines by Messrs. Blair & Co. are triples of 1,000 I.H.P., steam being supplied by two single-ended boilers working at 160 lbs. pressure. As the vessel left the ways she was christened *Volage* by Mrs. E. B. Richardson, of Hartburn.

**Selby.**—On March 11th Messrs. Ropner & Son, of Stockton, launched a steel screw steamer of the following dimensions:—Length, over all, 290 ft.; breadth, 40 ft.; depth, 18 ft. 6 in.; which they have built for a West Hartlepool firm. The steamer is built off the part awning-decked rule, having poop and raised quarter-deck, her deadweight carrying capacity being 3,000 tons on 17 ft. 6 in. The saloon and cabins for the captain and officers are fitted in the poop, whilst the engineers are accommodated in iron houses placed on the awning deck, near the entrance to the engine-room. She is built on the web-frame principle, leaving the holds entirely clear for cargo, and carries her water ballast in a cellular bottom and in the after peak. All labour-saving appliances are fitted for the economical working of the steamer, and also for the expeditious loading and unloading of cargoes. She has steam steering gear amidships and screw gear aft, four powerful steam winches, two large donkey boilers, working at the same pressure as the main boilers, patent windlass, stockless anchors, &c. The engines will work up to about 800 effective H.P., and are by Messrs. Blair & Co.; they are of the triple-expansion type, having cylinders 21 in., 34 in., and 56 in. by 36 in., steam being supplied by two large steel boilers, working at 160 lbs. pressure. As the steamer moved off she was named *Selby* by Miss Evelyn Ropner, of Preston Hall.

**Four-masted Barque.**—On March 11th there was launched by Messrs. Williamson & Son, at Workington, a four-masted barque, classed A1 at Lloyd's. Her dimensions are:—Length, 296 ft.; breadth, 46 ft.; depth, 27 ft. 5 in.; net register tonnage, 2,800 tons; gross, 2,950; deadweight on Lloyd's free-board, 4,650 tons. She is built of steel throughout.

**Penelope.**—On March 11th Messrs. Turnbull launched at Whitby a new screw steamer of the following dimensions:—Length, over all, 321 ft. 9 in.; ditto, between perpendiculars, 311 ft.; and extreme breadth, 40 ft. 6 in. She is classed 100 A1 at Lloyd's, and is built of steel. Her engines are by Messrs. Blair & Co., and the estimated deadweight carrying capacity of the vessel is about 4,200 tons. She has been built to the order of Messrs. H. Baxter & Co., Whitby, and was christened the *Penelope*.

**Rocio.**—On Tuesday, March 12th, Messrs. William Gray & Co., Limited, launched the fine steel screw steamer *Rocio*. She is of the following dimensions, viz.:—Length over all, 243 ft.; breadth, 34 ft. 6 in.; depth, 17 ft. 3 in., and has been built to the order of Messrs. Orders & Handford, of Newport, Mon. She will take Lloyd's highest class, and her deck erections consist of a raised quarter deck, bridge deck, and topgallant fore-castle. The saloon and accommodation for captain and officers will be fitted aft, and comfortable quarters for the engineers in the bridge, and for the crew in the fore-castle. The vessel is built on the web-frame system with a double bottom under each hold for water ballast, and there is also a ballast tank in the after-peaks. Four steam winches, donkey boiler, steam steering gear amidships, screw steering gear aft, Emerson, Walker & Thompson's patent windlass, schooner rig, boats on beams overhead and all modern appliances will be fitted. The engines are of the triple-expansion type working on three cranks, they are supplied by the Central Marine Engine Works of W. Gray & Co., Limited. The cylinders are 18 in., 28½ in. and 47½ in. diameter, and the piston stroke 33 in. The boilers, built of steel, are of large size, and will give an ample supply of steam at a working pressure of 160 lbs. per square inch. The vessel has been built under the superintendence of Mr. Jno. Boddy, and the ceremony of naming her *Rocio* was gracefully performed by Miss James, daughter of Christopher James, Esq., of Swansea. Mr. W. J. Orders, who was present on behalf of the owners, presented Miss James with a handsome gold bracelet set with diamonds. There were also present Messrs. E. George Protheroe, Jno. Boddy, James W. Thompson, &c., &c.

**H.M.S. Janus.**—H.M. torpedo destroyer *Janus* was launched March 12th, from the Jarrow Yard of Messrs. Palmer's Ship-

building and Iron Co., Limited. The vessel has been built to a model and design supplied by the builders, and is the first of three of the same class being built at Jarrow for the British Navy. Her dimensions are:—Length, 200 ft.; breadth, 19 ft. 9 in., and about 280 tons displacement. Her armament consists of one 12-pounder quick-firing gun forward on the conning tower, four 6-pounder ditto on the broadside, and one 6-pounder on a platform aft. There are also two revolving torpedo tubes on deck, arranged to fire on either broadside. She also has a powerful electric search-light. The officers and engineers' cabins are arranged abaft of the engine-room, and forward there is accommodation for about 40 men. The builders have guaranteed a speed of 27 knots per hour, and the machinery, which has also been designed by them, consists of two sets of triple-expansion engines, in one compartment, of a special design to suit the high rate of speed. Steam is supplied by four of Reed's patent water-tube boilers, constructed by the builders, fitted in two separate watertight compartments with the necessary fans for supplying air under forced draught. She is fitted with Caird & Rayner's evaporator, and fresh water distilling apparatus. The christening ceremony was gracefully performed by Mrs. A. M. Palmer, wife of one of the directors of the Palmer Co., after which the visitors adjourned to the model-room of the company where they partook of refreshments. Col. English, the general manager, proposed "Success to H.M.S. *Janus*," and the toast being enthusiastically drunk, the proceedings terminated.

**Duchess of York.**—On March 12th the steel paddle passenger steamer *Duchess of York* was launched from the yard of Messrs. R. & H. Green, shipbuilders and engineers, Blackwall. The vessel has been built for the service of the South-Eastern Railway Co., for the conveyance of passengers and goods between Folkestone and Boulogne. The principal dimensions are:—Length, 270 ft.; beam, 80 ft.; depth to promenade deck, 24 ft. The vessel has been thoroughly subdivided, there being eight watertight bulkheads continued to the upper deck, and thirteen air-tight compartments below the lower deck, which is plated over so that should the engine and boiler space be flooded the ship may maintain a freeboard of 2 ft. 6 in. The first-class accommodation is placed aft of the machinery space, there being a commodious saloon and eight private cabins in the deckhouse on the main deck, as well as the dining, sleeping, and ladies' saloons below. The second-class accommodation is placed forward of the machinery space; and the crew are berthed forward of this again. Under the fore-castle deck portable stalls are fitted for the conveyance of horses. The vessel will be lighted throughout with the electric light. The machinery is being constructed by Messrs. John Penn & Sons, of Greenwich, and will be of the three-cylinder compound diagonal type. The boilers are of the return tube type, two forward and two aft of the engine room, with a working pressure of 120 lbs. per square inch. Induced draught fans are to be fitted in the uptakes for the purpose of maintaining a good supply of steam. The high-pressure cylinder is 48 in. diameter, and each of the low-pressure cylinders is 68 in., with a stroke of 72 in. The speed is nineteen knots. Rudders are placed at both bow and stern, with a steam steering gear to each, and a hand gear for after rudder. The vessel is under the survey of Lloyd's and the Board of Trade, to be registered under the highest class. Captain Boxer, R.N., marine superintendent, and Mr. N. Guy, marine engineer to the South-Eastern Railway Co., are inspecting the vessel during construction. On leaving the ways the vessel was named by Miss Bevan.

**Bulwago.**—On March 12th [the large Cape liner *Bulwago* was launched from the Walker Shipyard of Sir W. G. Armstrong, Mitchell & Co. The *Bulwago* is the last of three sister vessels ordered by Messrs. Bucknall Brothers, on behalf of the British and Colonial Steam Navigation Co., for their well-known line to the Cape and East Coast of South Africa. The *Johannesburg*, the first of the three, having already started on her first voyage, whilst the second vessel, *Fort Salisbury*, is now completed and will leave the Walker yard in a few days. The vessels are of the three-decked type, and have been built of steel to the highest class at Lloyd's. Their principal dimensions are:—Length, 376 ft.; breadth, 47 ft.; depth, 30 ft. 6 in., with a deadweight carrying capacity of over 6,000 tons, which they carry with the statutory freeboard. The vessels have a poop, fore-castle, and very extensive bridge or midship citadel, which forms an important part of the vessel, embracing as it does the accommodation for officers, and also 66 first-class passengers, the cabins for which are situated partly upon the

upper deck, at the fore end of the bridge, and partly upon the bridge itself, and as these latter cabins will be exceptionally airy, with large square windows, they will be more attractive for passengers, the more so that the deck overhead is carried the full length, and the full width of the vessel, forming an excellent covered promenade, whilst the deck above being practically free of obstructions the passengers will have an additional most spacious and airy promenade. The passenger accommodation in general is very elaborate, consisting of large dining saloon, capable of seating the whole of the passengers at once, large smoking room, ladies' boudoir, and large and airy sleeping cabins. In view of the trade for which the vessels are intended the ventilation has been very specially considered. Electric fans are provided and so arranged that the ventilation of the cabins can be regulated at will, whilst in the dining saloon a very simple and efficient arrangement of portable electric fans have been fitted for causing currents of air during hot weather in the Red Sea and tropics. Electric bells are fitted to all cabins and state-rooms. The vessel will be lighted throughout with an electric installation carried out on the branch sub-division system by Messrs. Clarke, Chapman & Co. In no case are there more than ten lamps in a sub-circuit, and there is therefore no risk of large sections of the ship being accidentally thrown into darkness. Moreover, the generating plant embraces two complete duplicate dynamos and engines, each capable of lighting the ship. A complete refrigerating installation is fitted by the Linde British Refrigerating Co. The deck machinery and cargo gear is probably the most complete of its kind yet fitted to any vessel. It comprises very large donkey-boiler, numerous steam winches, steam windlass, steam warping capstan, steam steering gear, and eight specially strong tubular steel derricks, two placed to each hatchway, and capable of lifting 25 tons. The vessel was named the *Bulwago* by Mrs. Henry F. Swan, of North Jesmond, and immediately after the launch was taken to Messrs. R. and W. Hawthorn, Leslie & Co.'s St. Peter's Works, where she will receive her machinery, which is of the triple-expansion system, having cylinders 30 in., 50 in. and 80 in., by 54 in. stroke, with three single-ended boilers working at 180 lbs. pressure, and which are arranged to be worked by Howden's system of forced draught. The owners were represented at the launch by Mr. H. A. B. Cole, consulting engineer and naval architect, to whom is due the design of the vessels as well as the specifications, which are of the most comprehensive kind, so that the three vessels in question will in all respects be thoroughly up to date.

**Verbena.**—On Wednesday, March 13th, Messrs. Furness, Withy & Co., Limited, launched from their shipbuilding works at Hartlepool a large steel screw steamer built to the order of the well-known firm of shipowners, Messrs. J. Lilly & Co., West Hartlepool, and from the care in the designing of the vessel it is anticipated that she will be a profitable addition to their fleet. The vessel is a substantial type of a modern cargo boat, measuring over 300 ft. in length, and built throughout of Siemens-Martin steel, with a large measurement and deadweight capacity, and is built to the highest class at Lloyd's. Every care has been taken to construct her as strong as possible for the heavy deadweight trade, and at the same time she has been so designed that she will be especially suitable for trading in shallow waters. The vessel is built on the web-frame system with cellular double bottom all fore and aft, and subdivided at intervals, the after peak being also available as a tank. The main and fore holds are divided by iron watertight bulkheads efficiently stiffened by an iron longitudinal division. Steam suction as well as hand pumps are fitted to each compartment, so that if the vessel were damaged by collision or stranding, she would remain afloat. The greater portion of the shell plating is in 24-ft. lengths, and is efficiently backed up by strong sectional framing to the top of vessel all fore and aft, the topside plating being extra thick to withstand the heavy Atlantic trade. The bottom plating is also thicker in way of the ballast tanks, to allow for the vessel lying aground whilst loading. The whole of the weather decks, tank top, floor plates, &c., are also of extra thickness, and the hatchways are of extra size to take in the bulkiest cargo. Large winches to hatches, patent steam steering gear amidships with hand gear aft, steam windlass, large donkey boiler, and patent stockless anchors are fitted. The vessel will be rigged as a pole-masted schooner, and to make her available for bridge and canal work the topmasts are telescopic. The engines and boilers have been constructed by Messrs. T. Richardson & Sons, Limited, Hartlepool, and



are of massive design, with every provision for economical working. The ship has been constructed under the careful supervision of Captain J. Lilly, who has had the advantage of practical experience, and the engines and boilers have been supervised during construction by Mr. C. E. Smith, who has introduced several important modifications, all tending to the more economical working of the vessel. On leaving the ways the vessel was gracefully christened *Verbena* by Mrs. Lilly, of Stranton House, West Hartlepool. The launch was a very successful one and was witnessed by a large number of visitors, who afterwards adjourned to the builders' offices, when every success to the new vessel was heartily wished for.

**Dorrie.**—On March 14th a splendidly modelled steamer was launched from the yard of Sir William Gray & Co., Limited, of the following dimensions:—304 ft. between perpendiculars, 44 ft. beam and 23 ft. 2 in. depth moulded, built to the order of Messrs. Stainthorp, Kitching & Co., of Stockton-on-Tees. She will take Lloyd's highest class, has raised quarter-decks, bridge deck and topgallant fore-castle, four large hatchways with powerful winch to each, and direct-acting steam windlasses, self-housing anchors and steam steering-gear, with neatly fitted and furnished saloon, captain and officers' rooms aft, engineers' rooms of large dimensions tastefully fitted under the bridge, crew having spacious and well-ventilated quarters under the topgallant fore-castle. She will be fitted by the Central Marine Engine Works, of Sir William Gray & Co., Limited, with triple-expansion engines of 1,100 H.P. working on three cranks, cylinders 28 in., 36½ in. and 62 in., the stroke of piston 39 in., and fitted with patent evaporator, patent piston packing rings, patent gland packings and patent preserver sleeve fitted to propeller shaft, and other modern improvements for the economy of fuel and stores. Boilers built of steel, of extra large dimensions to give an ample supply of steam, working at a pressure of 160 lbs. per square inch. Also extra large donkey boiler for discharging cargo. The vessel and machinery have been built under the superintendence of Mr. James Summers, of Middlesbrough. The ceremony of christening the ship *Dorrie* as she left the ways was gracefully performed by Mrs. Kitching, wife of one of the managing owners.

**Aureola.**—On March 14th Mr. Henry Scarr launched at Beverley, an iron keel, built to the order of Mr. Webster, of Hull. Her dimensions are as follows:—61 ft. 6 in. by 15 ft. 6 in. by 8 ft.; amidships; carrying capacity, 130 tons.

**Phoebe.**—On March 14th there was launched from the Walker Shipyard, on the Tyne, a steel paddle steamer, built to the order of the Tyne General Ferry Co., Newcastle. The principal dimensions of the vessel are:—Length, 113 ft.; breadth, 16 ft. 8 in.; depth, 7 ft. The vessel will be fitted with oscillating surface-condensing paddle engines by the Wallsend Slipway and Engineering Co. She was named *Phoebe* by Miss Rea, daughter of Mr. James Rea, secretary to the owners.

**Costeira.**—On March 16th a twin-screw steamer for the Amazon River trade, was launched by Messrs. John Jones & Sons, at Liverpool. Her dimensions are:—Length, 165 ft.; beam, 38 ft.; and depth, 10 ft. The hull is built of steel, and the engines consist of two sets of the triple-expansion type. The vessel was built to the order of Messrs. E. A. Da Costa & Co., of Liverpool, and was christened *Costeira*.

**Lombard.**—On Monday afternoon, March 18th, a large clipper-stem, spar-deck, screw steamer was launched from the shipbuilding and dry dock works, of the Blyth Shipbuilding Co., Limited, of Blyth. The vessel has been built for the Lombard Steamship Co., Limited, of London, through Mr. John White, of London, and is of the following dimensions:—Length, over all, 326 ft.; breadth, 40 ft.; depth, 27 ft. 9 in. The vessel is built principally of steel and has cellular double bottom throughout for water-ballast. Web frames are fitted in lieu of hold beams thus allowing very bulky cargoes to be stowed with ease. A hood is fitted over the after part of the vessel and a long bridge amidships under which the captain and officers' berths are placed, and on the top a chart and wheel-house is fitted. There are extra large steam winches fitted to each hatch by Messrs. J. Smith & Son, of Newcastle-on-Tyne, Donkin's patent steam steering-gear, Emerson's patent windlass for working the stockless anchors, and Clarke, Chapman's patent donkey boiler. The engines will be supplied by Messrs. Blair & Co., of Stockton-on-Tees, and are of the triple-expansion type and of large power. The vessel was gracefully named the

*Lombard* by Miss Vaughan, of Newcastle, daughter of the chairman of the Blyth Shipbuilding Co., Limited. The hull and engines have been built under the superintendence of Mr. George Walker, consulting engineer and naval architect, of London.

**Throstlegarth and Bangarth.**—On March 23rd there were launched from Messrs. Palmer & Co.'s Jarrow yard, two very fine modelled steel screw steamers, built to the order of Messrs. R. and J. H. Rea, of Liverpool. Their dimensions are as follows:—Length, between perpendiculars, 250 ft., beam, 36 ft.; moulded depth, 19 ft. 7 in., and is built to Lloyd's highest class under special survey. They have long raised quarter decks extending to after end of machinery space, and fitted with accommodation for the captain, officers, and engineers; and a topgallant fore-castle for the crew. The hulls are built of steel with cellular double bottom throughout, except in the engine and boiler space, and is fitted with three powerful steam winches and donkey boilers; patent direct-acting steam windlass, large self-trimming hatches, steam steering gear amidships, screw steering gear aft; and all modern gear for rapid loading and discharging of cargo. The engines and boilers, which are also being built by the Palmer Co., are of the triple-expansion type with cylinders 20 in., 38 in. and 54 in. by 36 in. stroke, and two steel boilers working at a pressure of 160 lbs. per square inch. The vessels are designed to load about 2,300 tons deadweight on 18 ft. draft of water, and have been constructed under the supervision of Mr. J. B. Edmiston, consulting engineer, of Liverpool. On leaving the ways the vessels were christened *Throstlegarth* and *Bangarth*, by Mrs. Russell Rea, and Mrs. James H. Rea, respectively.

#### LAUNCHES—SCOTCH.

**Goodwin.**—On February 22nd the London and Glasgow Engineering and Iron Shipbuilding Co., Limited, Govan, Glasgow, launched the second of two large steel screw steamers built by them for the Clyde Shipping Co., Limited. This vessel is 391 ft. 8 in., by 46 ft. 6 in., by 30 ft. 6 in., moulded, and will carry between 6,500 and 7,000 tons deadweight, having a gross tonnage of about 4,700 tons, and has been built to the highest grade of the British Corporation and under their special survey. She is intended for the Eastern trade, and is fitted up with all the most modern appliances for handling cargo, &c., including seven large specially-designed steam winches, made by Clarke, Chapman & Co.; capstan and windlass by same makers; and steam steering gear by Caldwell & Co., Limited. The ship is fitted with electric light throughout. Special attention has been given to the officers and crew's accommodation, the rooms being all very large and airy, each of the officers and engineers having a separate room. Besides having a double bottom to hold water ballast, there is a large chamber tank abaft engine-room, so that the ship can be navigated to all parts of the world without cargo. The hold capacity is over 8,000 tons. The builders also supply the machinery, the engines being triple-expansion, with cylinders 27 in., 42 in., and 89 in. diameter, by 54 in. stroke. Hcwden's forced draught is fitted to the boilers. As the vessel left the ways she was gracefully named the *Goodwin* by Miss Ethel Kidston, of Finlaystone.

**Azov.**—On February 22nd Messrs. Charles Connell & Co. launched, from their Scotstoun Shipbuilding Yard, Whiteinch, the steel screw steamer *Azov*, built on foreign account. Her dimensions are:—Length, 255 ft.; breadth, 35 ft. 9 in.; depth, moulded, 18 ft. 9½ in.; with a deadweight carrying capacity of 2,500 tons, and has been built to Lloyd's highest class. The engines, which are of the improved triple-expansion type, having cylinders of 19 in., 31½ in., and 51½ in. diameter, by 36 in. stroke, worked by one single-ended boiler 16 ft. diameter by 11 ft. long, at 160 lbs. pressure, are being constructed by Messrs. Dunsmuir & Jackson, Govan.

**Flying Buzzard.**—On February 23rd Messrs. William Hamilton & Co. launched from their Glen Yard, Port Glasgow, a powerful screw steam-tug of about 400 tons gross tonnage for the Clyde Shipping Co., Limited, Glasgow. The following are the principal dimensions:—Length, between perpendiculars, 150 ft.; breadth, 24 ft. 6 in.; depth of hold, 13 ft. The vessel has been built to the owners' specification considerably in excess of Lloyd's requirements, and is fitted with water ballast trimming tanks both forward and aft. The accommodation for the officers and crew is of the most complete description. The

machinery, which is being supplied by Messrs. Rankin & Blackmore, of Greenock, is on the triple-expansion system. The cylinders are 18 in., 29 in., and 47 in. diameter, by 38 in. stroke, the boiler working to a pressure of 160 lbs. As the vessel left the ways she was gracefully named *Flying Buzzard* by Miss Ethel Kidston, of Finlaystone. After the launch the vessel was towed to Greenock to receive her machinery.

**Dorothy.**—On February 25th there was launched from the yard of the Montrose Shipbuilding and Engineering Co., Limited, a steel screw cargo steamer, the *Dorothy*, built to the order of a London merchant, and of the following dimensions:—Length, 130 ft.; breadth, 25 ft.; and depth, 11 ft. 5 in. She will have engines with 16 in. and 32 in. cylinders, and 24 in. stroke. She has been constructed to Lloyd's highest class, and will carry about 500 tons. She will be towed to Leith, where she will be engined by Messrs. Hall-Brown, Buttery & Co., Govan.

**Kaisow.**—On February 26th Messrs. David & William Henderson & Co. launched from their yard at Partick the first of three steel screw steamers, which they are building to the order of the China Mutual Steam Navigation Co., Limited, London, for their Eastern trade. The dimensions are:—Length, 370 ft.; breadth 46 ft.; depth 29 ft. 8 in., with a gross tonnage of about 4,000 tons. The hull and machinery are constructed in excess of Lloyd's requirements, and are classed in their register. The vessel is also provided with the Board of Trade passenger certificate. The hull is to the three-deck rule, with two complete steel decks. There is a poop, long bridge amidships, and topgallant forecabin. Arrangements are made for carrying a large quantity of water ballast. The pumping arrangements for dealing with this are of the most complete description. The stern post and rudder are of forged iron, the latter being of the builders' latest single-plate pattern. The upper deck and poop bridge and forecabin decks are sheathed with teak. The deck machinery consists of steam capstan, windlass, steam steering gear, and steam winches. These latter are ten in number, and in conjunction with a most complete system of derricks render the vessel exceptionally well suited for the rapid working of the large and varied cargoes she will carry. The derricks are capable of lifting weights up to 30 tons. The masts are telescopic, to suit the Manchester Ship Canal. The crew's quarters are fitted under the topgallant forecabin, and those for petty officers under the poop, which also covers the screw steering gear. The saloon, state-rooms, and captain's and chief officers' rooms are in a large steel house fitted on the bridge deck. The saloon is handsomely furnished, and is finished in polished hardwood. The state-rooms are of large size. A specie-room is fitted in this house adjacent to the saloon. The officers and engineers' rooms and mess-room are also on the bridge deck at the sides of the engine casing. All the rooms are heated by steam. A teak chart and wheelhouse is fitted on the top of the saloon deckhouse. Electric light is fitted throughout the vessel, including cargo clusters for the rigging when working cargo at night. The propelling machinery has been constructed by the builders' firm, and consists of a set of triple-expansion engines, with cylinders 26 in., 42 in., and 71 in. diameter, by 48 in. stroke, and two large single-ended boilers, constructed for a working pressure of 180 lbs. The boilers are fitted with Howden's patent system of forced draught. The auxiliary machinery is of the most complete description. The propeller blades are of manganese bronze. As the vessel left the ways she was named *Kaisow* by Mrs. Gulland, wife of the managing director of the China Mutual Co.

**Roastrevor.**—On February 26th Messrs. William Denny & Brothers launched from the Leven Shipyard, Dumbarton, a twin-screw steamer named *Roastrevor* for the London and North-Western Railway Co. The dimensions of the vessel are:—Length, 272 ft.; breadth, 35 ft.; depth, 15 ft. She is intended for passenger and goods service between Holyhead and Greenore, and will be fitted with triple-compound surface-condensing engines by Messrs. Denny & Co. The christening ceremony was performed by Mrs. Binney, wife of Captain Binney, marine superintendent of the company.

**Banshaw.**—On February 27th Messrs. John Scott & Co., Abden Shipyard, Kinghorn, launched a steel screw steamer to the order of Mr. Joseph Holt, Liverpool. Since the launch of the *Mentmore* it attracted the largest crowd of sightseers, and after gliding safely down the ways hearty cheers were raised. The vessel is 260 ft. long by 38 ft. by 21 ft. 9 in., and it is expected that she will be able to carry 2,700 tons burden on the

lightest draught of water. Her engines, which have also been built by Messrs. Scott & Co., are of 900 I.H.P., and their working pressure is expected to exceed 200 lbs. per square inch. The steamer was named the *Banshaw* on leaving the ways, and at once steamed up the Firth on her first trial. She was christened by Miss Chalmers, of Liverpool. Another steamer is on hand for the same owner.

**Sark.**—On February 28th Messrs. Mackie & Thomson launched at Govan a steam screw trawler named the *Sark*, for the Steam Fishing and Ice Co., Hull. Her dimensions are:—Length, between perpendiculars, 90 ft.; extreme breadth, 20 ft. 6 in.; depth, moulded, 11 ft. 10 in., with a tonnage of 150 tons. The engines have been made by Messrs. Muir & Houston.

**Hersilia.**—On March 11th Messrs. Ramage & Ferguson, Limited, launched from their shipbuilding yard at Leith, a very finely modelled steel steam yacht of about 450 tons yacht measurement, built to their own design and to the order of the Rev. John Hutchison, D.D., Afton Lodge, Bonnington, Edinburgh. The principal dimensions are:—Length 161 ft., between perpendiculars; breadth, 24 ft., and depth, moulded, 15 ft., while the engines are of the builders' most improved type of triple-expansion, with cylinders 15 in., 24 in. and 39 in. diam. by 27 in. stroke, supplied with steam from a large steel boiler working up to 160 lbs. pressure. The arrangement of state-rooms and cabins below provides accommodation for the owner and a large number of guests, while the fittings throughout are in light oak of a most tasteful description. On deck there is a large deck saloon, chart-room, captain's room, galley, and the other usual fittings of a first-class yacht. Throughout the yacht the builders have introduced all the most recent appliances and fittings, and when finished there is little doubt but she will prove to be one of the most comfortable and perfect vessels afloat. On leaving the ways the yacht was named *Hersilia* by Miss Hutchison, of Afton Lodge, Edinburgh. A large number of ladies and gentlemen witnessed the launch, and were afterwards entertained by the builders, when the toasts usual on such occasions were duly honoured.

**Kansu.**—On March 12th Messrs. Scott & Co., Greenock, launched a steel screw steamer, named the *Kansu*, for the China Navigation Co., Limited. Dimensions:—Length, 260 ft.; breadth, 38 ft.; depth, 22½ ft.; with a carrying capacity of 2,400 tons. The builders will supply triple-expansion engines of 1,500 I.H.P. This is the fourth steamer recently launched for this company by Messrs. Scott & Co., and there are six more to follow.

**Dorris.**—On March 13th Messrs. Lobnitz & Co., Renfrew, launched a handsome steam yacht of 170 tons for Mr. Thomas Benakin. The yacht has been built to the design and under the superintendence of Mr. A. H. Brown, N.A., London, and will be fitted with triple-expansion engines by the builders. On leaving the ways the yacht was christened *Dorris* by Miss Jenny Young, of Millburn House, Renfrew.

**Norwood.**—On March 13th Messrs. Hall, Russell & Co. launched at Aberdeen a steel screw steamer built to the order of the Aberdeen, Newcastle and Hull Steam Shipping Co. The vessel, which was built to take the place of the steamer *Countess of Aberdeen*, recently lost, is of the following dimensions:—Length, 229 ft.; breadth, 30 ft.; depth, 16 ft. 6 in.; and 800 tons gross register. She was built to class 100 A1 at Lloyd's, and was named *Norwood*.

**Cleopatra.**—On March 13th Messrs. Caird & Co. launched at Greenock, a mail and passenger steamer of 4,000 tons register for the Austrian Lloyd's Steam Navigation Co. The new vessel was named *Cleopatra* by Madame Von Kodolitch, wife of the technical director of the Austrian Lloyd's Steam Navigation Co. The dimensions of the new vessel are as follows:—Length, 377 ft.; breadth, 44 ft. 9 in.; and depth, 30 ft. 6 in., moulded, and of 4,100 tons gross. She will be supplied by the builders with triple-expansion engines of between 4,000 and 5,000 I.H.P. Built of the best steel, and in accordance with Lloyd's highest requirements for a spar-deck ship, the *Cleopatra* has accommodation for 80 first, 40 second, and about 200 third-class passengers.

**Inakenderoun.**—On March 14th there was launched by Messrs. John Fullerton & Co., Paisley, the first of three steel screw steamers of about 200 tons each which they are building to the order of Messrs. Thomson & Campbell, London, for a foreign Government. The steamer has been specially designed as a revenue cruiser, commodious accommodation being fitted

for officers and crew. Powerful electric search-light is fitted on the bridge, look-out cage on foremast, steam windlass, steam steering gear by Reid, of Paisley, along with other specialities. Compound engines of great power are being supplied by Messrs. Ross & Duncan, Govan, for high speed. The owners were represented by Mr. J. B. Campbell, of London, and Captain Kyle, under whose superintendence the steamers are being built. The steamer was named *Inskenderoun* by Mrs. Alex. Fullerton, Glenclay, Bridge of Weir.

**Benalder.**—On Thursday afternoon, March 14th, Messrs. Alex. Stephen & Sons launched from their works at Linthouse, a handsomely-modelled steel screw steamer, being the sixth steamer built by this firm to the order of Messrs. Wm. Thomson & Co., Leith, for their well-known "Ben" line of China and Japan traders. The vessel is of the following dimensions: Length, between perpendiculars, 330 ft., breadth, extreme, 41 ft. 9 in., depth, moulded, 27 ft., and has been constructed under Lloyd's supervision for their highest class of 100 A1 three deck rule, conforming also with all the Board of Trade requirements for passenger certificate. Like all the steamers of this line, she has the now uncommon but graceful outwater bow surmounted with a handsome carved figure-head and trail-boards, and being of two-masted schooner rig with yellow funnel, the vessel has quite a yacht-like appearance in the water. The deck erections consists of full poop, bridge deck enclosing engine and boiler casing, and topgallant forecabin. She has been constructed with a double bottom on cellular principle for water ballast, has six steam winches, steam capstan windlass, steam steering gear and all the latest and most approved appliances for the efficient and economical handling of ship and cargo, special attention being given to facilities for rapid loading and discharging. Under the bridge deck, accommodation is provided at the fore end, for saloon, captain's room and spare state rooms, while the officers and engineers are located at after end; all spaces being fitted up in a substantial and comfortable manner. The crew, as usual, are berthed in the topgallant forecabin. The engines, which were fitted on board before launching, are of the most improved triple-expansion type, having cylinders 25 in., 41 in., and 67 in. diameter, by 42 in. stroke, steam being supplied from two extra large steel boilers at 160 lbs. pressure. As the vessel left the ways she was gracefully named the *Benalder*, by Mrs. Thomson, wife of Captain Robert W. Thomson, who is to take command of the vessel.

**Speedy.**—On March 25th Messrs. Ramage & Ferguson, Limited, launched from their shipbuilding yard at Leith, a steam yacht of 110 tons, built to the order of Baron Barreto, Brandon Park, Suffolk, and from the designs of Dixon Kemp, Esq., of London. The yacht is fitted with triple-expansion engines of the builder's design, and is expected to steam 18 knots on trial. The ceremony of naming the yacht *Speedy* was gracefully performed by Mrs. Ramage, of the Hawthorns, in the unavoidable absence of the Baroness Barreto.

### TRIAL TRIPS.

**Alleghany.**—On February 21st the s.s. *Alleghany*, built by Messrs. B. Napier & Sons, Govan, for the Atlas Steamship Co., went on her trials. This vessel has been built to form one of the line of steamers which run between New York, Hayti, Jamaica, and the Republics of Colombia and Costa Rica. In view of the warm climate in the trade in which the *Alleghany* is to be employed, the passenger accommodation is placed entirely above the main deck and amidships, the 80 large state-rooms provided for the complement of 60 saloon passengers being on this deck, whilst the dining saloon, social hall, smoking-room, and the other modern accessories required for comfortable passenger travel are in commodious houses on the promenade deck, above the sleeping accommodation. The general dimensions are:—Length, 322 ft.; breadth, 38 ft.; depth, moulded, 26 ft.; with a topgallant forecabin, bridge-house, and poop aft, and has been built under special survey to the highest grade of the British Corporation, with the Board of Trade requirements for passenger steamers, and also in accordance with the American Government rules. A very complete installation of electric lighting has been fitted throughout the vessel. The machinery consists of a set of triple-expansion engines; with cylinders of 24 in. for the high pressure; inter-

mediate, 40 in.; and low pressure, 68 in., with a stroke of 48 in. These are supplied by two unusually large single-ended boilers, carrying 200 lbs. pressure of steam, fitted with Howden's forced draught, the intention being to maintain an I.H.P. of over 2,000, to propel the vessel at a mean speed of nearly 14 knots per hour. The object of the high speed is to enable the vessel to bring cargoes of bananas from Costa Rica to New York in the shortest possible time, as the fruit is very perishable in its nature. The specifications for the ship and engines were prepared for the owners by Messrs. William Esplan & Son, of Liverpool, who also superintended the construction. This is the first vessel built by the firm for the Atlas Co., which has a fleet of nine vessels solely employed in the trade between New York and the West Indies, making six voyages every month. These vessels are in close connection with the liners from Glasgow, Liverpool, and London, and carry large quantities of British manufactures and many passengers to the tropics by a system of through arrangement with the owners of these vessels. The trials, which lasted all day, were conducted off Wemyss Bay, and several runs were made on the measured mile, at varying revolutions of the engines, for the purpose of testing the speed attainable with different powers developed. The engines worked smoothly and satisfactorily during the entire trials, and the result obtained exceeded the owners' requirements.

**Riverdale.**—On February 23rd the steamer *Riverdale* went down the Firth of Clyde on her trial trip. The *Riverdale* was built to the order of Messrs. James Little & Co., Glasgow, by Messrs. Charles Connell & Co., Whiteinch, and engined by Messrs. Dunsmuir & Jackson, Govan. She is an awning-deck vessel, 320 ft. long, 42 ft. wide, and 28 ft. in depth from the awning deck. Her engines are 23 in., 38 in., and 62 in., by 42 in. stroke. Built to the highest class of the British Corporation, her dead-weight capacity is 4,900 tons. She is fitted with all the latest appliances for the economical working and rapid discharge of cargo. The *Riverdale* is intended principally for the Eastern trade, and will be commanded by Captain Lawrence, who has had wide experience in that and other routes. The vessel cruised about the firth for several hours, and her performance in the matter of steaming power was regarded as satisfactory both by owners and builders. In the course of the day luncheon was served in the saloon. Mr. Charles Connell presided, and among those present were Mr. H. W. Little, Mr. F. L. Wrede, and Mr. T. L. Duff, of the firm of Messrs. James Little & Co.; Mr. Archibald Denny, Dumbarton; Mr. Peter Denny, jun., Dumbarton; Mr. Wm. Jackson, Mr. Peter M'Lellan, Captain Lawrence, and Captain J. B. Murray, marine superintendent.

**Theme.**—On Saturday, February 23rd, the steel screw steamer s.s. *Theme*, built to the order of W. A. Grainger, Esq., Belfast, by Messrs. The Atlas Shipbuilding Co., Troon, had her trial trip in Belfast Lough. The vessel is of the following dimensions:—Length, between perpendiculars, 176 ft.; breadth, 26 ft. 6 in.; depth, moulded, 13 ft. 7 in. She has been built under special survey, and classed 100 A1 at Lloyd's, and is fitted throughout with all the most recent appliances for a first-class cargo coasting steamer. The engines, which are of the triple-expansion type, have been built and fitted on board by Messrs. Victor Coates & Co., Limited, Belfast, cylinders being 14 in., 23 in., and 39 in., by 33 in. stroke; working at a pressure of 180 lbs. per square inch, steam being supplied by one steel boiler with patent furnaces. The engines worked admirably, the trial being highly successful and satisfactory to all concerned. The vessel was designed and constructed under the superintendence of Mr. H. MacColl, of Belfast. After the trial trip the *Theme* proceeded to Troon. It may be interesting to note that this is the first ship built in Scotland and sent to Belfast to have the engines and boilers fitted on board.

**Carperley.**—On Wednesday, February 27th, the s.s. *Carperley*, which has been built by Messrs. Ropner & Son, Stockton-on-Tees, was taken to sea for trial trip. She is of the following dimensions, viz.:—Length, between perpendiculars, 275 ft.; breadth, 39 ft. 6 in.; depth, moulded, 19 ft.; and is classed 100 A1 at Lloyd's. She has a break poop, raised quarter and a partial-awning deck extending continuously from abaft the engine-room right forward, with chart-house amidships, and also large iron houses containing roomy accommodation for the engineers. The saloon and cabins for captain and officers are in the poop aft, and the crew and firemen are berthed in the forecabin forward. The steamer has web frames in all

cargo holds, dispensing with beams, and has a cellular bottom and after peak tank for water ballast. Emerson, Walker & Co.'s patent steam windlass, Davis's steam steering gear amidships, with Hastie's screw gear aft, four large steam winches, two donkey boilers, working at the same pressure as the main boilers, shifting boards, stockless anchors, and all the latest appliances for loading and discharging quickly. Her triple-expansion engines are by Messrs. Blair & Co., having cylinders 21 in., 34 in., and 56 in., by 36 in. stroke, with two large steel boilers, working at a pressure of 160 lbs., and fitted with an improved evaporator. Everything worked in a most satisfactory manner, a speed of 10½ knots per hour being attained. The steamer has been built for Messrs. R. Ropner & Co., West Hartlepool, and will carry 8,000 tons deadweight on 18 ft. She has also a large cubical capacity.

**Slidrecht.**—On February 28th the new steel screw steamer *Slidrecht* left the Tyne on a trial trip. The vessel, which is a fine specimen of a cargo steamer, has been built by Messrs. Wood, Skinner & Co., of Bill Quay-on-Tyne, to the order of Mr. Phs. van Ommeren, of Rotterdam. The *Slidrecht* is of the well-deck type, with cellular double bottom all fore and aft, and has been constructed under special survey for Lloyd's highest classification, viz., 100 A1. The principal dimensions of the vessel are:—Length, 285 ft. over all; breadth, 30 ft.; depth, moulded, 20 ft.; and she has a deadweight carrying capacity of 8,200 tons. The engines, which have been built and fitted by the North-Eastern Marine Engineering Co., are of the triple-expansion type, having cylinders 21 in., 35 in., and 58 in., and 39 in. stroke. During the loaded trial the ship attained an average speed of 9½ knots against a pretty strong head sea, the machinery working without the least hitch, the owners and all on board expressing themselves highly satisfied with the vessel and the results obtained. Captain C. G. Heidemann, of Rotterdam, who has superintended the building of the vessel, has now taken command of her.

**Tokio.**—This fine steel screw steamer, built by Messrs. Richardson, Duck & Co., for Messrs. Thomas Wilson, Sons & Co.'s Eastern trade, was taken for trial on Friday, March 1st, after loading bunkers and part of her cargo in Middlesbro' dock, a total of about 3,800 tons. She has been built to Lloyd's highest class, on the three-deck rule, and is of the following dimensions, viz.:—Length, over all, 376 ft.; beam, 45 ft. 6 in.; depth, moulded, 30 ft. The deck erections consist of poop, bridge, and topgallant forecabin. A handsome saloon and state-rooms have been fitted up in an iron house on bridge deck for passengers and captain, chart and wheel-house being on top of this house. The steam steering engine placed in engine-room is worked by shafting from wheelhouse. Ample accommodation for officers and engineers is fitted in an iron house at after end of engine-room on upper deck. Crew and petty officers are berthed in forecabin under upper deck, with large sleeping berths; also mess-room and lavatory. A cellular double bottom is fitted fore and aft for water ballast. She has also fore-and-aft peak tanks, 7 steam winches, double derricks to all hatches, steam windlass, stockless anchors, etc. The engines, by Messrs. Blair & Co., Limited, have cylinders 24½ in., 40½ in., 66½ in., by 42 in. stroke; steam being supplied by three large boilers working at 180 lbs. pressure. The vessel left Middlesbro' on Friday morning at 6 o'clock, and after the compasses had been adjusted the run for Hull, where she will complete loading, was commenced. From South Gare light to Spurn Head light, a mean speed of 11½ knots, with 59 revolutions to the minute, was obtained, the engines working very satisfactorily. The owners' surveyors, Messrs. J. F. Wilkins and John Spear, who were on board, were very pleased with the vessel's performances.

**Steinberger.**—On March 1st the trial trip of the fine steel screw steamer *Steinberger* took place in Tees Bay. This vessel has been constructed by Sir Raylton Dixon & Co., Cleveland Dockyard, Middlesbro', for the Hansa Steamship Co., of Bremen, and is the fourth steamer built for the same owners within the last 20 months, a duplicate being now also on the stocks. Her principal dimensions are:—Length, 352 ft.; breadth, 44 ft.; depth, moulded, 29 ft. 7 in.; and she has a deadweight carrying capacity of about 5,500 tons. The upper decks are of teak, the main deck of steel and the vessel is divided by six watertight bulkheads. The cabin accommodation (placed amidships), and fittings are of the best description, and the vessel is supplied with all the latest appliances for the rapid loading and discharging of cargo. Triple-expansion engines of the latest design have been fitted by Messrs. T

Richardson & Sons, Limited, Hartlepool, with cylinders 25 in., 39 in., 67 in., by 45 in. stroke. A full-speed run of some hours' duration was made, during which time the engines worked to the entire satisfaction of all on board. The boilers steamed easily at 180 lbs. pressure. At the conclusion of the trial trip the vessel proceeded direct to Antwerp. The hull and machinery have been constructed under the personal supervision of Mr. D. Wulff, superintendent engineer to the Hansa Co.

**Warrior.**—On March 1st the new iron screw steam tug *Warrior*, built and engined by Messrs. J. P. Rennoldson & Sons, of South Shields, proceeded to sea from the Tyne on her official trial trip. The dimensions are, 105 ft. between perpendiculars, by 20 ft. beam by 12 ft. depth moulded. A raised deck fitted forward, extending from stem to bridge, renders the vessel specially suitable for sea towing. The bunkers, placed amidships, are of extra size, having capacity for 100 tons. The propelling machinery consists of a set of triple-compound surface-condensing engines of 500 I.H.P., the cylinders being 13½ in., 22 in., and 36 in. in diameter by 24 in. stroke of piston. Steam is supplied by one steel tubular boiler of extra size, having a working pressure of 160 lbs. The *Warrior* has been built to the order of Messrs. Dick & Page, of London. The trial throughout gave most satisfactory results, fully 12 knots per hour being attained.

**Premier.**—On March 2nd the s.s. *Premier*, a new well fishing vessel, built by Messrs. Cochrane & Cooper, Beverley, to the order of the Anchor Steam Fishing Co., Limited, Grimsby, went on trial trip. The *Premier*, which is of the following dimensions:—107 ft., by 21 ft., by 11 ft. 6 in. depth of hold, has triple-expansion engines of 50 N.H.P., fitted by Messrs. C. D. Holmes & Co., Hull. The vessel gave great satisfaction, the machinery throughout the whole run working without the slightest hitch. She behaved well, and showed herself to be a splendid sea-boat, the trial being thoroughly successful and entirely to the satisfaction of the owners.

**Marino.**—On March 2nd the trial of this steamer, built by Messrs. Harland & Wolff, and owned by Messrs. Thomas Dixon & Sons, of Belfast, took place on the Clyde. After a successful run the ship proceeded to Cardiff to load for Bombay. The *Marino* is a steel vessel, 370 ft. long, 43 ft. broad, about 31 ft. deep, and 3,744 tons register. She is propelled by triple-expansion engines, having cylinders 24 in., 40 in., and 66 in. diameter, and 42 in. stroke.

**W. A. Massey.**—On Saturday, March 2nd, the trial trip of the *W. A. Massey*, the new steam pilot cutter, took place, and was an event which will rank first in importance in the history of the Humber Pilotage service. Hitherto the work of serving ships at sea has been restricted to sailing cutters, but for years the pilots have been agitating for the introduction of steam into the service, believing that its advantages would far outweigh the present method, and add immeasurably to the efficiency of the pilotage system. The *W. A. Massey* is the pioneer in steam pilotage outside the Thames, and all who have been instrumental in launching the new steam venture are sanguine of her success. On Saturday morning the *W. A. Massey* was moored at the Minerva Pier ready for departure on her first trip to the North Sea. There were about 80 gentlemen on board. Shortly before 11 o'clock the ropes were cast off, and the start was made. The vessel went beautifully down stream towards the mouth of the Humber, her engines working splendidly. Off Grimsby the compasses were adjusted by Mr. Olsen, of that port. A heavy northerly swell was running, with a smart breeze, but the ship proved herself a splendid sea boat, and did not take a drop of water on board. The log, which was timed by Mr. Olsen, was hauled in after an hour's run, and the speed of the cutter ascertained to be 9½ knots. As only 9½ knots had been guaranteed, the trial was considered eminently satisfactory, and more particularly so as there was a heavy swell and the firemen were "hors de combat."

**Rossall.**—On March 12th the s.s. *Rossall* went on her trial trip. She is a fine steel screw steamer, built by Messrs. Wm. Gray & Co., Limited, to the order of Messrs. Galbraith, Pembroke & Co., of London. She takes Lloyd's highest class, and her dimensions are:—Length, over all, 322 ft.; breadth, 42 ft.; and depth, 26 ft. The deck erections consist of a half poop, bridge over machinery space, and a forecabin deck. The saloon and cabin are aft, the engineers' rooms in the after part of the bridge deck, and the crew's accommodation forward. The hull is built on the web-frame system, with double bottom

under each hold. Large hatchways are fitted, four steam winches, steam steering gear amidships, screw gear aft, two donkey boilers, patent direct steam windlass, and shifting boards throughout, stockless anchors, two masts telescopic, with schooner rig, and all modern working appliances for general trading. The engines are of the triple-expansion type, and have been supplied by the Central Marine Engine Works. The cylinders are 23 in., 36 in., and 62 in. in diameter, with a piston stroke of 39 in., and steam is supplied by two large steel boilers, working at a pressure of 160 lbs. per square inch. The *s.s. Rossall* is the fifth steamer engaged at the Central Marine Engine Works for Messrs. Galbraith, Pembroke & Co. The vessel left the harbour about noon, and after adjusting compasses the engines were driven full speed till dusk, everything working in a highly satisfactory manner, there being no hitch or trouble of any kind, and no water whatever applied to any bearing. The supplementary feed is made up by one of Mudd's patent evaporators, and the tail shaft is fitted with the patent preserver sleeve. The vessel and her machinery have been built under the superintendence of Capt. Page and Mr. T. O. Charters, both of which gentlemen were on board at the trial, and accompanied the vessel to Cardiff, to which port she immediately proceeded at the end of a most successful trial trip. The shipbuilders were represented on the trial by Capt. J. Murrell, and the engine builders by Mr. Thomas Mudd.

**Monarch.**—On March 14th the new steam trawler *Monarch* went on trial trip. The *Monarch*, which has been built to the order of the Anchor Steam Fishing Co., Limited, Grimsby, by Messrs. Cochrane & Cooper, Beverley, and engined by Messrs. C. D. Holmes & Co., Hull, is of the following dimensions:—93 ft. by 20 ft. 6 in., by 11 ft. depth of hold, with triple-expansion engines of 40 N.H.P. The machinery worked splendidly throughout the whole run, the vessel showing herself to be a splendid sea boat, the trial being thoroughly successful and entirely to the satisfaction of the owners. The owners were represented by Mr. Lettère and Mr. Bennett, the builders by Mr. Cochrane, and the engineers by Mr. Holmes.

**Mount Sirion.**—On March 15th the new steel screw steamer, *Mount Sirion*, recently launched from the shipbuilding yard of Messrs. Workman, Clark & Co., Limited, Belfast, proceeded down Belfast Lough on her trial trip. This vessel has been built to the order of Messrs. Smith & Service, of Glasgow, and specially designed for their requirements. The dimensions are:—Length, 385 ft.; breadth, 43 ft. 6 in. moulded; depth, moulded, 28 ft. 9 in., with a gross tonnage of 3,280 tons, and a large deadweight carrying capacity. The vessel has been built to class 100 A1 at Lloyd's, and also in accordance with the requirements of the British Corporation. Deep framing has been introduced instead of hold beams and quarter pillars dispensed with to obtain the most favourable stowage capacity. The spar deck is of iron and the main of steel, with beams fitted to each frame. Six watertight bulkheads subdivide the ship, giving four cargo holds, each provided with ample hatchways, the two larger ones each having two steam winches with the derricks outrigged to suit. The deck erections consist of a poop, bridge and topgallant forecastle. In the bridge is placed the accommodation for the captain and officers with the saloon in the front of the bridge. The engineers' rooms are in wing-houses at the after end, and under the forecastle deck are the crew's quarters. The poop is arranged with a hatch and suited for cargo purposes. Ritchie's bituminous cement has been introduced for the cementing of the inside and top of the cellular double bottom, and other parts of the vessel usually coated with Portland cement. All the deck machinery and other fittings are of the most approved type and construction, and include Muir & Caldwell's steam-steering engine and Wilson's winches. The *Mount Sirion* is rigged as a two-masted fore-and-aft schooner, with the masts arranged on the telescopic principle to suit the Manchester Canal. The machinery has been constructed at the builder's engine works, and consist of triple-expansion engines of the most modern type with cylinders of 23 in., 37 in., 63 in. diameter, stroke 42 in. Steam is supplied from two large steel boilers at a working pressure of 180 lbs., and a large horizontal auxiliary boiler provides for the deck machinery. After cruising about Belfast Lough for some time, the vessel was run on the measured mile when an average speed of 11½ knots was obtained.

**H.M.S. Surly.**—The *Surly*, the last of the three torpedo boats which Messrs. James & George Thomson, Limited, Clydebank,

are building for the Admiralty, went on her official trials on the 15th ult., in the Firth of Clyde. The weather was of the most unfavourable description. Rain fell heavily from the start, and there was a strong breeze from the south-west. The vessel left Clydebank shortly before ten o'clock, and proceeded direct to Skelmorlie. On six runs over the measured mile her mean speed was 27.6 knots—the corresponding revolutions being 398—which even under the unfavourable conditions was in excess of the guarantee. To complete the three hours' continuous steaming stipulated in the contract, the run was continued down firth. Outside the head wind was, if anything, stronger, and the sea less favourable to fast steaming, but the pace actually improved as the trial advanced, and when the return voyage was commenced, just to the south of Arran, the little vessel was travelling astonishingly fast, and with a smoothness that reflected the greatest credit on the builders. In the *Surly* Messrs. Thomson have progressed, as they invariably do, with succeeding vessels of the same type, for at the end of her three hours' run the mean speed came out at 28.05 knots, the revolutions being 406. The steering trials—rather a tedious process after 28 knots—followed, and by half-past five o'clock the vessel was beside her sister ships—*Rocket* and *Shark*—in the dock at Clydebank. The builders, who were, it may be recollected, the first private firm to complete their contracts under the Naval Defence Act of 1889, are also the first to deliver three torpedo boats of the current contract. The mean speed of the *Surly* on the three hours' run is, it may be noted, amongst the highest, if not actually the highest, yet recorded for the class. Mr. Welsh, of the Constructors' Department, and Mr. Ellis, of the Steam Department, watched the trials on behalf of the Admiralty, and the builders were represented by Mr. George P. Thomson and Mr. J. G. Dunlop. The *Rocket's* average on the measured mile was 27.7 knots, and on the six hours' run 27.4, and the *Shark's* were 27.5 and 27.6 respectively.

**Star of New Zealand.**—On March 21st this new steamer proceeded down Belfast Lough on her trial trip, having on board a party representing the owners and builders. She is the fourth vessel built by Messrs. Workman, Clark & Co. for Messrs. J. P. Corry & Co., London, and is of the following dimensions: Length, 393 ft. 6 in., breadth, 46 ft. 7 in.; depth, moulded, 31 ft. 2 in., with a gross tonnage of 4,712 tons. The vessel is of the three-deck type, and built considerably in excess of Lloyd's requirements for the 100 A1 class, and with upper and main decks of steel with the exposed parts of the upper deck sheathed. Deep framing has been introduced in place of hold beams, which leaves the holds clear for the stowage of cargo. A cellular double bottom extends fore and aft for water ballast. The forward holds and tween decks have been insulated to suit the carrying of frozen meat, in which trade the vessel will be largely engaged with Australia and New Zealand. The refrigerating machinery and method of insulating are on the most approved principle, and the engine can be worked at the full boiler pressure when necessary. In order to provide for rapid loading and discharging, two powerful steam winches have been placed at each of the hatchways with derricks outrigged to suit. On the upper deck the erections consist of a long poop, bridge and topgallant forecastle, the latter extending a distance of 120 ft. from the stem, the fore portion contains the rooms for the petty officers and crew's quarters, the remainder is fitted as a cargo hold, and equipped similar to the others. In the bridge is placed the accommodation for the engineers and officers who are berthed in winghouses on each side of the ship. Across the front of the bridge is placed the saloon, which is tastefully finished in oak cime the panels fitted in with floral designs also on oak. On deck above is the captain's house with chart and pilot-house above on the flying bridge. The vessel has been rigged as a two-masted brigantine, the topmasts as well as the lower masts being of steel and arranged on the telescopic principle. All the deck machinery, consisting of winches, steam steering gear, windlass, &c., are by approved makers and of special design to suit the owners' views. The machinery has been constructed at the builders' engine works, and consists of triple-expansion engines with cylinders 26½ in., 44 in., and 73 in. diam., stroke 48 in., with steam supplied from three large boilers at a working pressure of 180 lbs. and fitted with Howden's system of forced draught, with the fans placed in a recess at the fore end of the engine-room above the boilers. The boilers are covered with James Duff & Co.'s Pearl brand of non-conducting composition. After cruising about the Lough for some time the vessel was run on



the measured mile, when an average speed of 18 knots was obtained. The *Star of New Zealand* then proceeded on her way to London, under the command of Captain Simpson, to load for her maiden voyage.

**Kaisow.**—On March 21st the new steamer *Kaisow*, built by Messrs. David & William Henderson & Co. for the China Mutual Steam Navigation Co., of London, went down the Clyde for her trial trip. The vessel is of the following dimensions:—Length, 370 ft.; breadth, 46 ft.; depth, 29 ft. 3 in.; and is fitted with triple-expansion engines, with cylinders, 26 in., 42 in. and 71 in., with a stroke of 48 in. The owners were represented at the trial trip by Mr. Reid, the chairman, and Mr. Gulland, the managing director of the company. As a result of a series of runs on the measured mile a mean speed of 13½ knots was attained. The engines worked all day in a most satisfactory manner, and to the entire approval of owners and builders. The vessel returned to Glasgow in the evening, where she will load for China and Japan.

**Azor.**—On March 22nd the *a.s. Azor*, recently launched by Messrs. Charles Connell & Co., Whiteinch, and built for Sr. Sigismundo Copaitich, Fiume, after loading with a full cargo of coal, went down the Clyde for her trial trip. She was tried on the measured mile for a number of runs, and attained the satisfactory speed of over 9½ knots. The machinery, which was supplied by Messrs. Dunsen & Jackson, Govan, worked most satisfactorily, and the vessel proceeded to sea in the afternoon.

## Review.

**Model Engine Construction.** By J. Alexander. Whittaker & Co., of 2, White Hart Street, Paternoster Square, London, and 66, Fifth Avenue, New York.

THE book that is now before us is an extensive treatise on the subject of model engine construction, and the author has most probably produced a more complete volume on the matter than has hitherto been done. There is no doubt in our mind that a considerable amount of educational value attaches to the manufacture of working models to the youth during his apprenticeship, not so much on account of the practice afforded in the use of tools, but as a means of inducing thought on the various points of detail of construction, and mode of working of a machine, and enabling the student to more readily grasp them, than could be done by mere textbook study. The study of cause and effect in a concrete form is far more acceptable to a student than any possible presentation of facts in an abstract form.

The volume is certainly very bulky indeed for the matter contained therein, and it is difficult to understand why it was not set out in a more compact form. The volume contains something over 800 pages, the subject matter being interspersed with 59 illustrations of details of construction. In addition, there are 21 sheets of drawings, giving details of various types of boilers, engines and other mechanical appliances. The volume commences with a description of and method of using the various tools requisite in the manufacture of models. The details of construction of boilers and their fittings are then dealt with *in extenso*, in such a way as to enable any person with ordinary intelligence to construct either one or other of the types indicated. The author then proceeds to describe parts of a steam engine, the machinery and finishing of those parts, and finally their erection into the form of a complete working machine. The remainder of the book comprises descriptions relating to various classes of engines, a full detailed construction being given of each type. On the whole, it must be said that the author has treated his subject in a fairly complete manner, which will make the book very acceptable to those for whom it is written.

**New Editions.**—"Poole's Practical Telephone Handbook." Messrs. Whittaker & Co. announce the issue in a few days of a revised and enlarged edition of the above popular work. It is made more complete and up to date by the addition of chapters on "Electrical Measurements and Metallic Circuit Working" and a considerable amount of other new matter. The same firm announce the third edition of "Electricity in our Homes and Workshops," by Sydney F. Walker, revised and brought up to date. The chapters on "Telephones" has been re-written, and a chapter added, dealing with dry batteries. A new edition of Mr. Allsop's "Practical Electric Light Fitting" has recently been issued by the same publishers.

## Correspondence.

[It must be understood that, in giving insertion to communications under this heading, we do not in any way pledge ourselves to the opinions preferred therein. We will with pleasure insert any letters likely to benefit our readers, either from their intrinsic value or as being calculated to promote such discussion as will elicit facts valuable from their being the result of practical experience.—ED. M. E.]

### SHIP ACCELERATION AND FLUID RESISTANCE.

To the Editor of THE MARINE ENGINEER.

SIR,—I have taken care to keep separate the two distinct subjects of the constancy and the amount of acceleration of ships.

My paper to which you have taken exception discusses only the constancy, and reserves for a further paper the discussion of amount.

It seems to have escaped your notice that I distinguish the velocity, which is a transitory phase of a ship getting underweigh (a velocity continually changing) from a full speed of that vessel.

Say her full speed is 20 knots. On her way up to the 20-knot speed she has momentary velocities regularly increasing from zero up to 20 knots. And yet when she was momentarily endowed with a 15 or 16 or 17 knot velocity during her accelerative run she was not in the same hydrodynamic state as when running at full speeds of 15 or 16 or 17 knots; for a full speed is quite different from a momentary velocity of the same numeral value. And so, to avoid confusion, it becomes necessary to clearly distinguish between one and the other.

Let it be granted, for argument's sake, that "within certain limits resistance increases as the square of the speed."

Nothing which I have advanced in my paper denies or questions that statement. The conflict which you seem to think exists between my statements on this point and generally recognised theory is imaginary, and arises from your having treated my references to momentary velocities as though they referred to full speeds.

If a ship at twenty knots' full speed met resistance =  $\frac{1}{200}$  displacement (i.e., if  $\frac{W}{D} = \frac{1}{200}$ ) and if the resistance varied as the square of the speed, then at a full speed of 10 knots the resistance would be =  $\frac{1}{800}$  displacement (i.e.,  $\frac{W}{D}$  would =  $\frac{1}{800}$ ).

Now in both these cases the accelerative run would have momentary velocities of 1, 2, 3, 4, 5, 6, 7, 8, 9 knots. But these momentary velocities would not when  $\frac{W}{D} = \frac{1}{200}$  be hydrodynamically the same as when  $\frac{W}{D} = \frac{1}{800}$ . And as these corresponding numerals of momentary velocities do not represent corresponding hydrodynamic values, so likewise the momentary velocity of 10 knots, when  $\frac{W}{D} = \frac{1}{200}$ , is of quite a different value and character from the 10 knots' full speed when  $\frac{W}{D} = \frac{1}{800}$ .

As the increment of abscissæ may be constant while the increment of ordinates may vary; so the constancy of acceleration due to any given  $\frac{W}{D}$  ratio may, and does, consist, with great variations, of full speeds of one and the same ship.

If, even at the highest speeds, resistance continue to vary as the square of velocity, the ship which at 20 knots had resistance =  $\frac{1}{200}$  displacement, would, when her resistance became equal to the displacement (i.e., when  $\frac{W}{D} = 1$ ) have a full speed of 283 knots nearly (for  $\sqrt{200 \times 20} = 282.8$ ).

The accelerations of the ship in the three cases above specified, will be as follows:—

For 10 knots' full speed,	the accel. =	$\frac{1}{800} g$	=	0.04 ft. per sec.
" 20	"	"	=	$\frac{1}{200} g = 0.16$ " "
" 283	"	"	=	$\frac{1}{1} g = 32.2$ " "

The times which the ship would occupy in gaining these three full speeds respectively, are:—

For 10 knots, the time =  $\frac{10 \times 6080}{3600 \times 0.04}$  sec. = 422 secs.

" 20 " " =  $\frac{20 \times 6080}{3600 \times 0.16}$  " = 211 "

" 288 " " =  $\frac{288 \times 6080}{3600 \times 82.2}$  " = 15 " nearly.

The travels of the ship in the three cases above specified will be as follow :—

For 10 knots the travel to get up speed

=  $\frac{422 \text{ secs.} \times 10 \text{ knots} \times 6080}{3600 \text{ secs.} \times 2}$  = 3564 ft.

" 20 " " " =  $\frac{211 \text{ secs.} \times 20 \text{ knots} \times 6080}{3600 \text{ secs.} \times 2}$  = " "

" 288 " " " =  $\frac{15 \text{ secs.} \times 288 \text{ knots} \times 6080}{3600 \text{ secs.} \times 2}$  = " "

The accelerative space, or travel of a  $\frac{1}{96}$  full-size model of this ship would thus prove to be =  $\frac{3564}{96}$  = 37 ft. nearly.

So that in this above case (which is presumably that of a large and rather fine-lined ship, of low resistance and considerable accelerative travel) your recommendation of poles 40 ft. high would about meet the case.

I should like to make the experiment as you propose. But my 40 ft. tank at Wallsend has long given place to my pendulum resistance meter tank in Sunderland, which latter serves to measure the speed powers of ships perfectly (see printed description herewith inclosed).

But this Sunderland tank is barely 19 ft. long, and it is not in my power to re-erect a long tank like that of Wallsend, and fit it with poles 40 ft. high, just at present. Bluff small ships of same or smaller scale reach their full speeds in much less space.

Though the above figures are based on the assumption that resistance at all the speeds varies as the square of speed, if fact were not in accord with that assumption my argument, which in no degree relies on it, remains unaffected.

In the above figures themselves I do not think you will find anything unreasonably hard to believe, though I have applied, to evolve these figures, the same principles as you call in question in my paper, both as to constancy and as to amount of acceleration.

Nature escapes from the *reductio ad absurdum* which you laid at the door of the  $\frac{W}{D} g$  = accel. theory. Her mode of escape is as follows :—

A small mass of fluid in motion possesses the same supporting or buoying power as a larger mass of fluid at rest.

Thus we have seen often enough in the common shooting galleries a hollow glass sphere buoyed on the nimble summit of a water spray.

Similarly the water which buoys up a ship at rest—i.e., the mass which constitutes the ship's displacement—is a larger mass than that which supports her in a state of motion. The difference between these two masses, viz., the static and the moving masses of displacement may be expressed thus :—

Let D = static displacement mass.

" D<sub>1</sub> = displacement mass at the speed produced by W.

Then D = D<sub>1</sub> + W.

I think if you will follow out this last fact to its logical conclusion you will come to see that there is nothing absurd in the

$\frac{W}{D} g$  = accel. theory after all. On the contrary, once admit

that D<sub>1</sub> + W = D, and the ordinary laws of acceleration require that the amount of acceleration shall be what I have stated it is; for the fact we have to deal with is that the virtual mass of the ship's displacement in motion is not = D but is = D<sub>1</sub>; and so

$\frac{W}{D} g = \frac{W}{D_1 + W} g$ .

In order to explain this subject further, the principle of pulsation, which governs all motion, would have to be exhibited at such length as would ill comport with a letter of this kind.

I am, Sir, yours, &c.,

FRANK CAWS.

Experimental Tank, Sunderland, 14th March, 1895.

[We regret to say that we cannot see that the above is any answer at all to our *reductio ad absurdum* argument. We have suggested a plain experimental test as to whether our views or those of our correspondent are sound, and would now prefer, on our part, to allow the matter to rest until that experiment has been tried and reported.—ED. MARINE ENGINEER.]

## Miscellaneous.

**The New American Liner.**—The *S. Paul*, the second of the two sisters now building at Philadelphia for the express service of this line, has, it is reported by telegraph, met with an unfortunate mishap. Her launch was attempted on Monday, the 25th March, and was unsuccessful. The vessel got partly down the ways and remained fixed. She has sustained no damage, as far as is yet known, but the work of getting her afloat is expected to be tedious and costly. The details of the mishap have not yet transpired on this side, only one evening paper noticing the matter. This journal misled its readers as to the identity of the vessel by heading the announcement with the words "The United States Navy," and by speaking of the *S. Paul* as "an armoured cruiser," she will, of course, be an auxiliary to the United States Navy, and provision will be made for arming her, but hardly for armouring.

**The Imperial Russian Yacht,** the *Standard*, was successfully launched on March 10th, from the shipyard of Messrs. Burmeister & Wain's Engineering and Shipbuilding Co., Copenhagen, in the presence of the Crown Prince and Crown Princess of Denmark and a most brilliant gathering. The *Standard* has shared the fate of numerous Russian ships, material alterations having subsequently been made in the original contract. According to report the dimensions were to be as follows :—Length, 370 ft., breadth, 50 ft.; depth, 20 ft.; with a displacement of 5,587 tons. She was to be coated with teak and copper to above the water-line. The engines were to be compound, with two propellers, capable of indicating 10,600 H.P. The contract speed was 20 knots, and the time of delivery May 1st, 1895. The contract was subsequently altered, the copper coating was abandoned, the breadth was increased to 50 ft. 6 in., and the displacement reduced to 5,200 tons. The engines were to be triple-expansion, and the boilers after the Belleville system, whilst power and speed remained unaltered. The yacht will, on the upper deck, have two saloons, a drawing-room, and a dining-saloon capable of seating 60 persons. On the main deck will be a saloon for the Imperial family furthest aft, besides a smaller dining-saloon and rooms for the Emperor and Empress, the Dowager-Empress, and the grand dukes. There will also be rooms for the Imperial suite, the Naval Minister, and for the General Admiral. Forward will be the quarters of the officers. On the intermediate deck will be dining-saloons and saloons for the suite, and some rooms for servants and crew. On the lower deck will be rooms for the non-commissioned officers, &c. The *Standard* is the largest ship ever launched from a Scandinavian shipyard.

**The Tipstaff and the Lady;** or, the Man who did not Catch a "Tartar."—It has often been asked why the Admiralty and Probate Divisions are amalgamated. I do not now propose to answer that question, but I would notice the fact that the officials of the one part of the court do not seem to refer to those of the other, or to volunteer them advice. On the last sailing of the Castle liner *Tartar* to the Cape, it was announced when the President sat at 10.30 on the sailing morning, that a young lady who was bound to appear that day in court had committed, or was committing, a "contempt" by proceeding to the Cape instead of appearing before his lordship. After some little discussion, the tipstaff was sent off at 11.30 a.m. to fetch her. He found that she had left Waterloo by the Castle express at 11.40 a.m., and missing that, he returned empty handed. Had he known what some of those in court knew, he might—if he would—have spent an hour or two more in London, and yet boarded the mail boat in Southampton water. The last time I visited the Port of Southampton, I left Waterloo at 12.30 on the Saturday in a comfortable Bournemouth express, which took me to Southampton West in an hour and forty minutes. I had an excellent lunch at the Pier Hotel, spent a pleasant hour on board the new South-Western liner *Columbia*, with Mr. John Dixon the genial superintendent of the docks, and then walked to the mail tender which took me down to the liner off Calshot point. On that occasion the sailing was made by the *Roslin Castle*, which had just had a thorough overhaul, and whilst the mails were taken on board Captain Travers showed me with pride the alterations which had taken place. It was all done easily, quickly and without bustle. We cannot suppose that tipstaffs have less facilities than the writer of this column, and we must conclude that he did not wish to be successful in the chase of his fair quarry.



**Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from February 15th, to March 13th, 1895.**

- 2542 J. Casey. Steam valves.  
 2543 J. Casey. Construction of port holes for ships.  
 2552 T. O. Palmer. Feed-water heating apparatus.  
 2553 T. O. Palmer. Separating impurities from water in boilers.  
 2556 J. B. T. Leportier. Steamer coaling apparatus.  
 2565 S. Z. de Ferranti. Steam and other engines.  
 2566 W. Dickinson. Boiler furnaces.  
 2606 A. W. Gatsfield and W. Clark. Scraping hulls.  
 2607 L. H. M. Volekers. Making ships recognisable.  
 2632 T. R. Butler. Securing boat davits.  
 2641 W. Joyce. Slide valves.  
 2647 F. Cornwall. Ships.  
 2681 J. Medway. Lubricators.  
 2682 J. L. Mitton. Boiler fuel economiser.  
 2686 W. G. Wrench. Screw propellers.  
 2706 H. Paul. Closing bulkhead doors in ships.  
 2735 G. Vogel. Propulsion and steering of boats.  
 2770 G. Robson. Motive power engines.  
 2842 G. Munro. Protectors for water gauge glasses.  
 2853 T. E. Neal and T. Woodward. Furnace fire-bars.  
 2872 J. Crow. Forming flanges on pipes or tubes.  
 2906 F. W. Kitto and W. Haworth. Cooling of bearings.  
 2919 H. A. Clark. Speed regulators.  
 2922 R. B. Carsley and J. H. Betts. Furnaces.  
 2966 J. K. Starley. Wrenches.  
 2967 E. J. Green. Funnels.  
 2970 F. Herring and F. Esmead. Pressure valves.  
 2975 J. Anderson. Motors.  
 2987 M. Stahler and C. T. Dorr. Ships' bulkheads.  
 2996 H. Rongier and the Patent Weldless Steel Chain and Cable Co. Weldless chains.  
 2997 S. and S. R. Chetwood. Steam generators.  
 2998 The Cowper-Coles Galvanising Syndicate, and S. O. Cowper-Coles. Making metal sheets.  
 3004 W. Burton and J. H. Williams. Anti-incrustation composition.  
 3013 F. J. Lucas and A. E. Reeves. Speed gear.  
 3024 The Hon. C. A. Parsons. Portable steam pumps.  
 3050 W. A. Lees and F. Farnworth. Furnaces.  
 3055 F. King. Electric steering apparatus.  
 3070 A. J. Southwell. Steam pressure gauges.  
 3084 E. P. Holly and H. and C. T. Howard. Pressure reducing valves.  
 3109 A. A. Ackerman. Making face-hardened armour.  
 3111 J. S. D. Shanks and T. Harrison. Furnaces.  
 3122 M. Adler. Lever crank.  
 3133 R. Cockburn. Operating water-tight doors.  
 3141 W. Fairweather (The Babcock and Wilcox Co., United States). Steam pressure gauges.  
 3153 J. Gore. Pipe wrench.  
 3172 A. Coke. Ventilating pipes and manholes.  
 3180 R. Haddan (C. M. A. G. Boucley and the firm of Boucley, Thomas, Bardon, Clero, and Cie (Corderie Central), France). Cables.  
 3194 B. and L. Roper. Attaching copper to ships.  
 3204 W. G. Stevenson. Retarding the motion of vessels.  
 3209 J. H. Boulds. Water-tight bulkhead doors.  
 3212 G. C. B. Atkinson. Ships.  
 3221 F. H. Stacey and G. J. Beedham. Steam pumps.  
 3223 W. Walters. Steam glands or stuffing-boxes.  
 3226 F. E. Adams. Steering steamships and vessels.  
 3262 H. Lindley. Engine governors.  
 3269 C. H. Keats. Revolving lights for ships.  
 3379 E. Meikle (J. L. Vignolo, South America). Indicating sunken ships.  
 3311 R. G. H. Worth. Ventilating manhole covers.  
 3344 W. Harvey. Screw propellers.  
 3353 A. Marshall. Drag for arresting ships.  
 3379 G. Watson, O. W. James, and R. L. Bullock. Testing heat in furnaces.  
 3399 C. W. Thompson. Valve gear for engines.  
 3407 J. Klein. Steam traps.  
 3421 J. G. Penn. Screw propellers.  
 3426 D. J. Morgan. Looking steering gear.  
 3428 J. Tweedy. Balancing of steam engines.  
 3434 A. Collis. Preventing bursting of boilers.  
 3450 J. Huddart. Governors.  
 3459 L. MacBrayne. Steam boilers.  
 3481 H. Parsons. Bearings.  
 3484 W. Carter and The Hydraulic Engineering Co. Hydraulic stop valves.  
 3504 J. S. Raworth. Automatic expansion governors.  
 3506 J. S. Raworth. Speed regulators for engines.  
 3568 J. Brotherton, Limited, and E. Love. Tube joint.  
 3585 W. E. Lewis. Masts or spars for ships.  
 3618 F. Easom. Steering locks.  
 3630 T. A. Kennedy. Boat-lowering apparatus.  
 3631 J. Andrew. Valves.  
 3636 R. Watson and A. D. Mitchell. Floats for fishing-net purposes.  
 3637 J. Fairlie. Rig for schooners.  
 3638 F. W. Crossley. Internal combustion oil engines.  
 3642 J. Howden. Steam boiler and other furnaces.  
 3662 J. B. Scott. Contacts for torpedoes.  
 3666 H. Zeitz. Boiler.  
 3722 G. G. Rhodes. Furnaces of steam boilers.  
 3751 F. Edwards. Derricks.  
 3763 M. T. Neale and A. Smith. Submarine signalling.  
 3769 H. E. Werner. Packing.  
 3772 H. Davey. Water-pressure engines.  
 3773 J. A. and J. Hopkinson. Water-gauges for steam boilers.  
 3810 J. E. Greedy. Steam generators.  
 3817 V. Canrobert. Watertight bulkhead door.  
 3841 G. H. Nisbett. Ventilating manholes.  
 3850 W. Standing. Safety contrivance for boilers.  
 3877 A. Shields. Centre-boards for sailing boats.  
 3937 J. Eagles. Slide rule.  
 3943 H. Heckler. Swimming and life-saving device.  
 3951 H. H. Lake (A. Christensen, Denmark). Ships' hulls.  
 3982 J. Menzies, R. Rogerson, and J. Menzies, jun. Fluid pressure valves.  
 3992 M. Johnson and W. H. Witthell. Derrick topmast.  
 3999 H. Cotton. Boiler furnaces.  
 4024 J. Pembury. Fastening ropes into yokes of rudders, &c.  
 4032 A. J. Boulton (F. A. Broughton, Australia). Collapsible lifeboat.  
 4035 J. W. Wood. Slide valves.  
 4039 W. Lawrie. Metallic packings for pistons.  
 4044 G. Martens. Trawling nets.  
 4058 F. G. Houghton. Safety valves.  
 4075 W. D. Charlton and T. Clark. Ship mattress.  
 4098 A. D. Ottewill. Sight-feed lubricators.  
 4094 E. R. R. Hoyt. Steam boiler furnaces.  
 4135 M. Gerre. Boilers.  
 4158 H. McPhail. Steam generators.  
 4188 D. McGrath & Son. Steam governor for boilers.  
 4204 E. Wall and J. Sampson. Torpedo interceptor.  
 4206 R. McLaughlan and W. Abbey. Beam compasses.  
 4249 G. Beech. Life-saving apparatus.  
 4273 C. Ankers. Lubricators.  
 4276 T. Edge and J. R. Roscoe. Connecting-rods.  
 4347 W. W. Williams. Shafts of steam vessels.  
 4359 F. W. Challen and J. B. S. Brooks. Boiler valve.  
 4372 J. Knott and J. McDermott. Sectional marine engine.  
 4375 H. E. Inskip. Life-saving float.  
 4380 H. Mallet. A water-gauge for steam boilers.  
 4390 E. Howl. Steam boiler furnaces.  
 4454 W. Dickinson. Condensers.  
 4458 F. A. Langen. Electrically steering ships.  
 4474 J. E. Hornby. Funnels.  
 4512 T. Lishman. Steam generators.  
 4516 J. B. Miller. Shackles for vessel's chains.  
 4531 J. Weir. Piston rings.  
 4569 A. E. Alexander (W. H. Bradt and M. Marble, United States). Pressure gauges.  
 4586 W. F. Beart. Stopping leaks in ships at sea.  
 4604 J. B. Furneaux and E. Butler. Starting engines.  
 4605 J. W. Hedley. Covers for ships' hatchways.  
 4607 J. R. Müller-Landsmann. Smoke-combustion furnaces.  
 4613 J. P. Allen. Non-slipping cover for manholes.

- 4615 J. Smithyman and D. O. Davies. Damper for boilers.  
 4624 J. Robinson. Water gauges for steam boilers.  
 4625 G. Longworth. Mechanical stoker and smoke burner.  
 4630 G. M. Marchant. Sight-feed lubricators.  
 4636 J. Bromilow. Sight-feed lubricators.  
 4662 F. Lamplough. Steam traps.  
 4665 C. E. Farnell. Screw propellers.  
 4692 T. J. Bezemer and L. van Schie. Rotary engine.  
 4698 J. Alves. Supplying hot air to furnaces.  
 4710 G. Waller. A trapped float check valve.  
 4714 C. Scott, H. Hodgson, I. M. Livsey and J. B. S. Booth. Operating valves of engines.  
 4719 E. Welford and P. Mitchinson. Ships' winches.  
 4727 H. B. C. Webb and J. Lane. Lubricators.  
 4729 G. Chisholm. Safety valves and accessories.  
 4739 P. Baumert. Hydraulic propulsion of vessels.  
 4740, P. Baumert. Propulsion of navigable vessels.  
 4748 W. Ansell. Ships' signal lamps.  
 4786 Tangyes, Limited, and J. Robson, jun. Engines.  
 4792 J. E. Carroll. Feed-water heating apparatus.  
 4798 H. Baschy. Removing boiler incrustation.  
 4794 M. Jullien. Boilers.  
 4802 T. F. Wells. Self-levelling ships' berths.  
 4806 A. W. Horsbrugh and J. H. Lee. Compasses.  
 4831 K. D. Noble and J. Irving. Double tube boilers.  
 4916 J. E. Gibbins. Steam generating apparatus.  
 4920 W. Stewart. Steam generator furnaces.  
 4927 W. Beardmore. Armour plates.  
 4938 T. Langer. Regulating draught to furnaces.  
 4975 J. A. Normand and P. Sigaudy. Multitubular steam generators.  
 4998 E. Turnbull. Construction of vessels.  
 5049 W. P. Thompson (F. Loos, Germany). Lubricator.  
 5050 H. H. Noltenius (M. Sauza, South America). Anchors.  
 5073 A. J. Lester. Internal combustion engines.  
 5081 W. Freakley. Fire-grates for boiler furnaces.  
 5103 E. C. Mills and J. G. Chamberlain. Surface condensers.  
 5139 J. Smit and L. J. Smit. Dredgers and barges.  
 5147 A. E. Allison. Vertical slide furnace door.  
 5152 G. Ainsworth and J. Arnott. Lubricating the submerged portions of ships.  
 5156 O. H. Lawson. Metallic packing for stuffing-box.  
 5169 J. F. McLaren. Internal combustion engines.  
 5187 E. Harvey. Heating apparatus for boilers.  
 5225 E. G. Brewer (O. Bouquier, France). Smoke-consuming furnaces.  
 5275 A. Mack. Lifeboats.  
 5298 O. Scott and H. Hodgson. Steam engines.  
 5304 T. Keene. Packing for piston rods.  
 5315 Z. W. Baugh. Grates of boilers and furnaces.

## BOARD OF TRADE EXAMINATIONS.

NOTE.—1C denotes First Class; 2C, Second Class.

February 23rd, 1895.

- Anderson, Jno. . . 2C W.Hrtipl  
 Arnott, J. H. . . 2C Glasgow  
 Baxter, C. K. . . 1C Dundee  
 Beatson, A. . . . 1C Glasgow  
 Best, J. D. . . . 2C W.Hrtipl  
 Bird, Hy. F. . . . 2C "  
 Bowman, J. W. 2C "  
 Burden, Jas. . . 2C Cardiff  
 Burnett, D. . . . 2C Glasgow  
 Cameron, Jno. . 2C Dundee  
 Capus, C. G. . . 2C Cardiff  
 Clement, F. G. 2C "  
 Clinch, J. M. . . 1C "  
 Cowan, Jas. H. 2C Glasgow  
 Day, Thomas . . 2C W.Hrtipl  
 Dent, Joe. . . . 2C "  
 Dunsmuir, Alex. 2C Glasgow  
 Ferrell, Jas. E. 1C W.Hrtipl  
 Gillespie, W. B. 2C Glasgow

- Graham, A. P. . 2C W.Hrtipl.  
 Griffiths, P. F. . 2C Cardiff  
 Grimsby W. H. 1C "  
 Hooper, J. C. . . 1C "  
 Hopkins, Jno. . 1C London  
 Keay, Alex. D. 2C Liverpool  
 Kenny, Alex. . . 1C Dundee  
 Kirkpatrick, W. 1C Glasgow  
 Kistner, F. . . . 1C Cardiff  
 Lawley, Geo. T. 2C "  
 Lochhead, D. . . 1C London  
 Marrinos, T. . . 2C Cardiff  
 Minshaw, R. . . 2C Liverpool  
 Moir, Jno. . . . 2C Cork  
 Morrison, Neil. 2C Glasgow  
 Mudie, R. T. . . 1C Dundee  
 Nucator, J.B. S. 2C "  
 Nye, A. W. . . . 2C London  
 Paterson, Jno. . 2C Glasgow  
 Richardson, W. 2C W.Hrtipl.  
 Shea, E. S. . . . 1C Liverpool

- Struthers, R. A. 2C Glasgow  
 Tervit, Thos. . . 2C Dundee  
 Thompson, T.W. 1C W.Hrtipl.  
 Waterhouse, H. 2C Liverpool  
 March 2nd, 1895.

- Aoklam, Henry 1C Hull  
 Bell, J. B. . . . 2C N.Shields  
 Bell, W. G. . . . 1C Aberdeen  
 Bennett, L. M. 2C Hull  
 Blakey, W. . . . 1C Sunderland  
 Brandie, W. . . . 2C Aberdeen  
 Brown, D. W. . . 1C "  
 Campbell, A. . . 1C N.Shields  
 Carter, Thomas, 2C Sunderland  
 Chisholm, J. . . 1C Aberdeen  
 Dunn, William. 1C "  
 Hammond, J. C. 1C N.Shields  
 Hudson, W. . . . 2C Hull  
 Kermod, F. S. 1C Liverpool  
 Kerr, Andrew. . 1C N.Shields  
 Leslie, W. H. . . 1C Aberdeen  
 McKenzie, R. . . 2C Hull  
 Meikle, J. M. S. 1C Aberdeen  
 Morgan, W. A. 2C Liverpool  
 Morley, Robert. 1C Hull  
 Officer, James . 2C Aberdeen  
 Ross, G. M. . . . 2C "  
 Scott, Alex. . . . 1C "  
 Smith, J. A. M. 1C "  
 Wilson, J. W. . . 2C Hull

March 9th, 1895.

- Aiken, F. G. . . 1C N.Shields  
 Archer, Andrew 2C Leith  
 Bacon, H. G. . . 2C Hull  
 Barclay, W. G. 2C Liverpool  
 Bowler, C. J. . . 1C London  
 Branson, J. S. 1C Cardiff  
 Buchanan, T. J. 2C Leith  
 Clemond, R. F. . 1C Cardiff  
 Davidson, Alex. 2C Glasgow  
 De Bertodano, J. 2C London  
 Duncan, Alex. . 2C Leith  
 Dunn, David . . 1C Glasgow  
 Douglas, Frank 1C London  
 Eggers, William 2C Leith  
 Field, H. F. . . 1C N.Shields  
 Fletcher, John 1C Cardiff  
 Francis, Thos. 1C "  
 Gilbertson, H. A. 2C N.Shields  
 Hansen, C. W. 1C Cardiff  
 Holland, J. W. 1C N.Shields  
 Hutton, James 1C Cardiff  
 Johnson, Robt. 2C Glasgow  
 Laing, Wm. R. 1C Leith  
 Lambert, Robt. 2C Liverpool  
 Lidgerton, R. . . 2C N.Shields  
 Lloyd, W. H. . . 1C Cardiff  
 Mavis, F. J. . . 2C N.Shields  
 McCrick, Robt. 2C Liverpool  
 McMillan, D. . . 2C Cardiff

- Milburn, R. W. 1C N.Shields  
 Miller, W. T. . . 1C London  
 Milne, Thomas 1C N.Shields  
 Moffat, James. . 2C Leith  
 Morphew, G. S. 2C N.Shields  
 Nelson, G. B. . . 1C London  
 Olufsen, Peter 2C N.Shields  
 Orchardson, J. 1C "  
 Pepper, G. S. 1C London  
 Pott, George . . 1C Liverpool  
 Potts, W. T. . . 1C N.Shields  
 Renfrew, Robt. 2C Glasgow  
 Santos, E. . . . 2C Cardiff  
 Smith, H. J. L. 1C London  
 Summerson, G. 2C N.Shields  
 Thus, J. P. . . . 2C Cardiff  
 Tyrol, C. . . . 2C London  
 Urwin, Stephen 1C N. Shields  
 Watson, Arthur 2C Glasgow  
 Watts, F. H. . . 2C London  
 Wayman, Wm. . 2C N.Shields  
 Young, Colin . . 2C Glasgow  
 Young, Jas. E. 2C N.Shields

March 16th.

- Aitken, David . 2C Dundee  
 Barbour, James 2C Liverpool  
 Black, James . . 2C Greenock  
 Brodie, Niel . . 1C "  
 Byers, William 2C N.Shields  
 Carter, Sam. A. 2C Dublin  
 Chapman, W.M. 2C London  
 Crawford, John 2C Greenock  
 Davison, Geo. . 1C London  
 Davison, Wm. . . 2C N.Shields  
 Evans, Wm. A. . 2C Liverpool  
 Flinn, David B. 2C Greenock  
 Hails, Henry T. 2C N.Shields  
 Hart, Walter J. 1C "  
 Hill, Sidney J. 1C London  
 Houston, W.C. . 1C Greenock  
 Ions, Thos. R. . . 2C N.Shields  
 Lawrence, F. . . 1C "  
 Maloolm, James 1C Greenock  
 Marshall, R. J. . 2C N.Shields  
 Matheson, H.W. 2C Greenock  
 Mathie, Wm. . . 1C "  
 McLean, T. A. . 2C "  
 Miller, Hugh . . 2C "  
 Powell, Alex. R. 1C Dundee  
 Quinn, Alfd. H. 2C Liverpool  
 Rice, Joseph . . 1C London  
 Riding, John. . 2C Liverpool  
 Sivewright, J. . 1C Dundee  
 Smith, A. E. . . 1C London  
 Smith, Arthur 2C Liverpool  
 Smith, J. F. B. 1C N.Shields  
 Tyson, Thos. . . 1C Liverpool  
 Wallace, Geo. . . 2C N.Shields  
 Warren, F. E. . 1C London  
 Williams, John 2C Liverpool

**Institution of Engineers and Shipbuilders in Scotland.**—On the evening of March 26th the monthly meeting of the Institution of Engineers and Shipbuilders was held in the rooms, 207, Bath Street, Mr. George Russell presiding. The chairman made feeling reference to the death of Mr. Lindsay Burnet, and it was agreed that the Institution record their deep regret at the loss of such a prominent member. A paper on "The Extension of Loch Katrine Water Works" was read by Mr. J. M. Gale, M.Inst.C.E. Mr. Gale exhibited various maps and plans which showed vividly the present position and the future prospects of Glasgow water supply. A paper on "The Drawing Office," was read by Mr. Arch. Denny, of Denny Bros., Dumbarton. Discussions took place on "Electrical Transmission of Power in Shipyards and on Board Merchant Steamers," "The Strength of Ships' Beams," and "A New Development in Steam Engine Economy," on which subjects papers were read at last monthly meeting.

## The Marine Engineer.

LONDON, MAY 1, 1895.

SIR WILLIAM WHITE has contributed a most valuable paper to the Transactions of the Institution of Naval Architects upon the latest experiments, and theoretical deductions therefrom, of battleships at sea, and tests in calm water as to the extinction of rolling by the addition of bilge keels. Every compliment is due to the author for the courage of his frank statement that the experimental results have been as much a surprise to him as they will probably be to others, and he at once places the results before the tribunal most fitted to appreciate the magnitude and importance of the achievements. What has stood so long in the way of these results having been arrived at before has been the inconvenience in the abstract of bilge keels interfering with docking facilities, and further, the long-accepted formulæ of the late Professor Froude, as to the theoretical value of bilge keels on the extinction of rolling. As a matter of fact the actual co-efficient of value of bilge keels of small area, per square foot of area, has been found to be about ten times greater than that assigned by the late professor. Why this is so is still a matter of some conjecture; but for the present the practical fact is amply sufficient to ensure the general adoption of bilge keels, or an equivalent improved structure of hull, throughout our Navy, or at least throughout our first-class battleships. A steady platform for gun fire in a disturbed sea is evidently a boon to be sought for even at considerable disadvantage as regards facilities in dock accommodation. The valuable results obtained on the *Repulse* at sea when fitted with bilge keels, as compared with her former behaviour without them, and in comparison with sister vessels without bilge keels, was so marked that crucial experiments were at once carried out on the *Revenge* in still water before being fitted with bilge keels and afterwards, and the results have been tabulated in diagrams, most interesting and easy of comparison, which Sir William White submits to the Institute. The late Professor Froude published, about 20 years ago, a series of curves which he termed "curves of extinction," for a number of representative ships of the Royal Navy, and Sir W. White borrows two of these curves of the *Inconstant* and *Sultan* for comparison with his new experimental curves of extinction of the *Revenge* without bilge keels, and afterwards when fitted with them. The curve of extinction of the *Revenge* without bilge keels practically coincided with that of the *Sultan*, with the general result that in both ships without bilge keels the reducing rolls are practically isochronous,

and that it required about 45 to 50 swings for the rolling to be gradually reduced from 6 degs. to the vertical, to 2 degs. of inclination. When the *Revenge* was fitted with bilge keels it was found that the rolling was reduced from 6 degs. to 2 degs. in about eight swings, and the isochronism was found to gradually vary as the vessel came to rest. It was found also that the rate of extinction was practically accelerated when under headway and in proportion to the speed, which was also recognised by the late Professor Froude. It is also a remarkable fact that the addition of bilge keels on various battleships has materially improved their steadiness in steering, and what is still more surprising, has actually diminished their tactical diameter in making a complete circle, thus increasing their handiness in manœuvring. It is now also accepted from practical test in actual service that the bilge keels produce no sensible reduction in speed for power, or increase in coal expenditure for a given speed at a given draught. In addition to this valuable paper, Vice-Admiral Colomb presents to the Institution a most carefully tabulated series of comparisons of the total elements and the proportional elements of force as he estimates such functions for the battleships, cruisers and gunboats of the Navy. He considers the elements of effective force to be estimated by displacement, speed, coal supply, and endurance, and the number and calibre of offensive guns and torpedoes. In themselves these tabulated statements are most valuable as giving a comprehensive view of the offensive and defensive force of the whole of our Navy, but it is the deductions that have resulted from the computation of these tables, and which Admiral Colomb merely submits for consideration, that are most interesting. He finds that as displacement increases, which has been the tendency for the last 20 or 25 years, the speed also tends to increase as an absolute integer, but that when both the speed and the other elements of force are compared proportionately to a unit of displacement the force elements are all on a decreasing scale per thousand tons of displacement, though the speed unit shows that decrease to be the least, and the calibre of guns and coal endurance show it the most. It would appear, then, that the development of the present constructional ideas in heavier displacements tends to give an offensive or defensive force gradually decreasing per ton of displacement, and where the speed unit is exceptionally maintained, the other force units diminish in a corresponding degree. Where is this to end? With the sacrifice of all other force units to that of speed. Surely this would be useless. Or with the constant decrease of all units of force elements per units of displacement as the vessels increase in tonnage. Is this latter a necessity? asks, very pertinently,

Admiral Colomb, from the designers who ought to know. If so, where does the practical limit of efficient increase of tonnage come in? This opens a grave question, and one which will no doubt give rise to many diversities of opinion from experts.

THE thirty-sixth session of the Institution of Naval Architects took place in April, at the hall of the Society of Arts in London, with Lord Brassey, the President, in the chair. The absence of Sir William White through illness was much regretted, but he was represented by an able paper, on which we comment in a previous note. A numerous representation from the Clyde district was present, and we noticed amongst those present, Lord Charles Beresford, Admiral Sir John Hay, Vice-Admiral P. H. Colomb, Sir Frederick Bramwell, Professors Biles and Elgar, and Messrs. John Scott, John Inglis, John Ward, H. Napier, James McGilchrist, J. P. Wilson, and other well-known faces too numerous to mention. The report of the Council was received with approbation, referring as it did to the success of the Southampton meeting, to the great cordiality of the French invitations for the summer meeting, and to the agreement of the President to preside at the Paris meeting before his departure to occupy his new post as Governor of Victoria. Lord Brassey, in his address, referred at length to the naval lessons to be learned from the war between Japan and China, and considered that the value of protective armour had been conclusively established. The effect of the new explosives and of quick-firing armaments on armoured sides had proved so destructive, that it might be accepted as an axiom that no guns, except for repelling torpedo-boat attack, should be mounted without adequate protection. The speed also of a fleet he considered should be uniform so that there should be no laggards. Although granting credit to Parliament for what was being done to increase the strength of the Navy, he did not think that all that was to be desired had yet been done, and pointed out that France and Russia had each as many battleships building as we had, though not of such large tonnage. He understood that Sir William White, having added largely to the number of the most powerful battleships of large tonnage, thought that requirements now pointed to progress to be made with slightly smaller battleships. The fighting power of the Navy would be thus more distributed, and as the largest battleship was as equally unprotected from torpedo attack as the smallest, it was not well to have too many eggs in one basket. It was desirable that there should be a great increase in torpedo-boat destroyers, as a protection against these insidious little foes. The available harbour depths and that of the Suez Canal,

presented some limit also to the available tonnage for battleships for foreign service; altogether it was probable that the next batch of battleships should be about the size of the *Renown*. Dealing with the merchant service, he referred to the great carrying capacity of individual steamers, but curiously enough, regretted the disappearance of sailing ships, which he claimed were 30 per cent. cheaper than steamers, and saved 25 per cent. in working expenses on long voyages. Though there is no doubt as to the cheapness of sailing vessels in first cost as regards steamers, we wonder that the President did not see that there must be serious counteracting disadvantages, notably in loss of time, to counteract the apparent economy on long voyages, or the shipowners would soon find it to their profit to maintain them as ocean carriers, whereas their rapid disappearance proves the contrary, and all progress is necessarily the survival of the fittest. Lord Brassey is evidently tinged with the Colonial spirit in anticipation of his coming post, when he strongly urged Great Britain to subsidize the Canadian Pacific route to the East, and recommended co-operation in a liberal spirit with the colonies to maintain the great lines of communication of our vast empire. After the address by the President, and the usual business of receiving papers from members, to most of which we refer later in detail, the meeting, spread over three days, terminated with a pleasant international episode of the presentation of the Institute's gold medal to Mr. Taylor, of the United States constructive department, as a mark of appreciation of two most valuable papers contributed by that gentleman, which it was considered, bore the marks of original thought on professional subjects of great importance.

### EXPERIMENTS IN CONNECTION WITH EVAPORATION.\*

By D. B. MORISON, M.I.N.A., M.I.M.E.

THE universal practice on steamships a few years ago was to supply the loss of water, due to leakage in a condensing engine, from the sea direct to the boilers, but since the introduction of triple expansion, with its higher pressures and temperatures, the necessity for minimising the scale in boilers has resulted in the use of an independent apparatus, in which sea water is evaporated by means of steam, and the generated steam, being condensed, is delivered to the boilers free from all impurities. Apart from the necessity of such an arrangement from an engineering point of view, there is the commercial consideration of reducing the boiler scaling expenses, minimising the liability to accidents and prolonging the life of the boiler, as, whilst it is possible for careful engineers of long experience to work boilers without an evaporator, there are few superintendents who do not realize the fact, that in order to obtain the greatest engineering and commercial efficiency and as a safeguard against accidents, an evaporator is a necessary auxiliary on board a modern steamship. The quantity of water lost depends

\* Paper read before the Liverpool Engineering Society.

on the design and workmanship of the various details subjected to steam pressure, to the number of appliances and arrangements for preventing waste and to the care of the engineers in charge.

The chief sources of loss in the main engines are from the piston rod, valve spindle and feed pump glands, but these may be minimized by the use of automatic water drainers and special water-saving appliances, examples of which are shown on Figs. 1 and 2. Careful attention of those in charge to all the details of the various steam connections is the chief factor however, as there is no better index of the efficiency of an engine-room staff than the quantity of auxiliary feed water required.

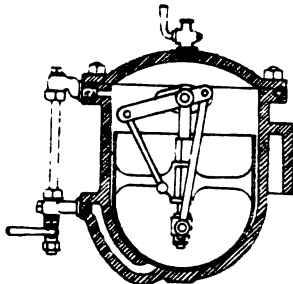


FIG. 1.

The ease with which loss of water in marine machinery can be made up, by simply allowing it to flow from the sea to the hot well, has often tended to mislead those in charge as to the quantity which should be required and the quantity actually used. The natural result is that there are large numbers of boats in which the loss is most extravagant, the engineers being either unaware of the fact or accepting the condition as normal.

One of the many examples which have come under the writer's notice was a steamer with an evaporator, which, even when coated with scale, would have been capable of producing four times the amount of fresh water which should have been necessary. The engineer reported that the evaporator was certainly of assistance, but he had to keep it going continually, clean it every day and use in addition a large amount from the sea. This is an apt illustration of the unconscious influence the old auxiliary supply from the sea had over the engineer, as his entire

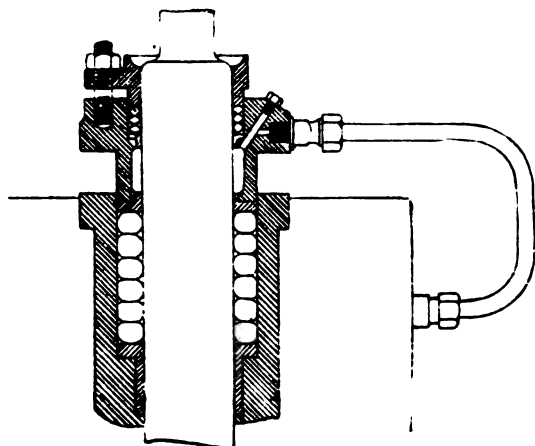


FIG. 2.

efforts were concentrated in endeavouring to compel the evaporator to produce sufficient water to make up the loss, he being totally blind to the fact that the amount of loss was both extravagant and unnecessary. An example of what may be considered an exceptionally high efficiency has been obtained on a steamer belonging to the Peninsular and Oriental Co., on which facilities were kindly given the writer by Mr. Manuel for obtaining reliable data extending over several voyages. The engines are 28 in., 44 in., 72 in. by 48 in. stroke, with two boilers of 160 lbs. pressure, steam steering gear, electric light and the usual auxiliary machinery being fitted.

At sea the average I.H.P. is 2,000, and the amount of auxiliary supply five tons per day. In the previous example the I.H.P. was about 1,000; each boat was fitted with identical evaporators, the Peninsular and Oriental boat used  $2\frac{1}{2}$  tons per 1,000 I.H.P. per day, and the other certainly not less than 15 tons, but probably nearer 20 tons. In order to allow a margin for auxiliary engines, it may be assumed that the consumption of water in the Peninsular and Oriental example is 15 lbs. per I.H.P. per hour, and by reference to the annexed table it is seen that  $2\frac{1}{2}$  tons is equivalent to  $1\frac{1}{2}$  per cent. of the total feed water.

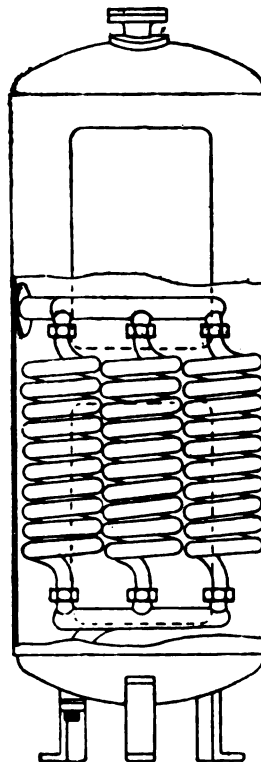


FIG. III.

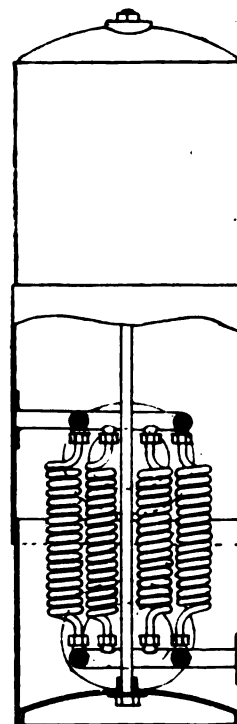


FIG. IV.

#### AUXILIARY FEED WATER.

Calculating the Feed Water at 15 pounds per Indicated Horse-power per hour.		Calculating the Feed Water at 18 pounds per Indicated Horse-power per hour.		Calculating the Feed Water at 20 pounds per Indicated Horse-power per hour.	
Percentage of Auxiliary Feed to total Feed Water.	Auxiliary Feed in tons per day per 1000 Indicated Horse-power.	Percentage of Auxiliary Feed to total Feed Water.	Auxiliary Feed in tons per day per 1000 Indicated Horse-power.	Percentage of Auxiliary Feed to total Feed Water.	Auxiliary Feed in tons per day per 1000 Indicated Horse-power.
1 per cent.	1.6	1 per cent.	1.98	1 per cent.	2.14
2 "	3.2	2 "	3.86	2 "	4.28
3 "	4.8	3 "	5.79	3 "	6.43
4 "	6.4	4 "	7.72	4 "	8.56
5 "	8.0	5 "	9.65	5 "	10.70
6 "	9.6	6 "	11.58	6 "	12.84
7 "	11.2	7 "	13.51	7 "	14.98
8 "	12.8	8 "	15.44	8 "	17.12
9 "	14.4	9 "	17.37	9 "	19.26
10 "	16.0	10 "	19.3	10 "	21.4
11 "	17.6	11 "	21.23	11 "	23.54
12 "	19.2	12 "	23.16	12 "	25.68
13 "	20.8	13 "	25.09	13 "	27.82
14 "	22.4	14 "	27.02	14 "	29.96
15 "	24.0	15 "	28.95	15 "	32.1

The consumption in the other boat would probably be about 18 lbs., and assuming 20 tons of auxiliary feed, the percentage

of the total would be 10·8 per cent. These cases may be considered extremes, but the greatest care is necessary in order to obtain maximum efficiency, as a number of very slight leakages when combined produce a large quantity at the end of 24 hours. The trials of the *s.s. Iona*, by the Research Committee of the Mechanical Engineers, may be taken as an example, as the loss was 6 per cent. of the total feed, although beyond a slight leakage at the feed pump glands during a portion of the trial, there was nothing apparent to the many observers on board which would account for such a large loss.

The Committee on Naval Boilers recommend in their report that not less than six tons per 1,000 H.P. be allowed, which would be about equivalent to 3 per cent. of the total feed. This allowance seems very small when the large number of auxiliaries are considered, but probably the estimate is made on the maximum I.H.P., which is, of course, very seldom obtained. It will be evident, therefore, that not only does the amount of auxiliary feed vary for different types of engines, but the variation may be very great in ships of the same class depending entirely on the condition of the main and auxiliary machinery. In passenger boats, where the labour is sufficient to keep everything in good order, a safe allowance is eight tons per 1,000 I.H.P. at sea, which, assuming a consumption of 15 lbs. of water per I.H.P., is five per cent. of the total feed; but in cargo boats, where the available labour is much less, and so much attention cannot be given to details, 10 tons per 1,000 I.H.P. is advisable. In both these cases there is ample margin for contingencies, and if evaporators are fitted of these capacities but still

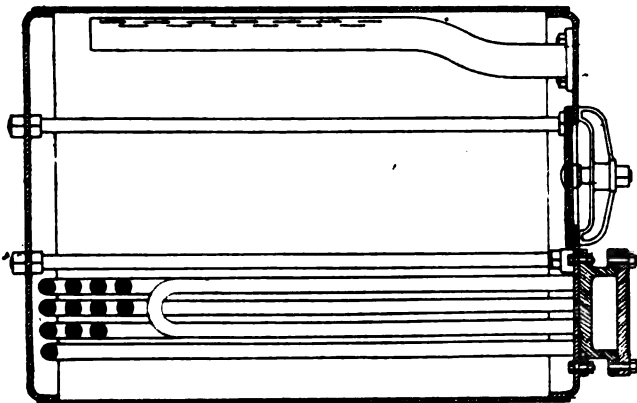


FIG V

are not sufficient, then the waste of water is highly extravagant and altogether unnecessary.

The arrangement of multiple evaporators working in series so that the generated steam from the first is utilized to generate steam in the second, and so on, although being the universal system for sugar refining and distilling, is not in use to any extent on shipboard, as it involves unnecessary complication and initial cost, besides entailing more attention when working; so that what is generally understood by a marine evaporator is a single vessel in which salt water is boiled away, the heating medium being steam. From the elementary nature of the apparatus the different designs are exceedingly numerous, as given a vessel in which water is evaporated by means of steam within a tube, there is ample scope for variation of detail. But simple variation is of no value except accompanied by definite improvement, which only results from development based on the practical requirements of those engaged in the working of the apparatus at sea; and it is becoming more and more recognized by designers that not only must all auxiliaries on shipboard be simple, but that the labour necessary to maintain efficiency whilst at work must be reduced to a minimum. There is only a certain amount of labour available, and the requirements from that labour are ever increasing; in fact, if engineers at sea are hampered with any detail which requires an undue amount of attention, then, as a consequence, something else suffers. It is, therefore, practically imperative for success that such an elementary apparatus as a marine evaporator must not only be efficient from a scientific point of view, but also from a marine engineer's point of view, which is equivalent to saying that it

must be simple in construction, strong, requiring but little attention when working, and the least possible labour in cleaning. It would be altogether beyond the possibilities of a paper to deal with all the designs which have been proposed, so the writer will refer only to some of those which have been adopted. Long before marine evaporators were introduced, Messrs. Normandy, Kirkaldy, and others, had been engaged in the manufacture of distillers, but it was the well-known engineer, Mr. Weir, of Glasgow, who showed the marine engineering world the advantages which would result by the use of what are now generally known as marine evaporators. Mr. Weir's first apparatus was designed in 1884, but his evaporator in its present form was introduced in 1887, and since that date Mr. Weir's lead has been followed very largely. Evaporators may be divided into the following classes, viz., those in which—

(1) The heating tubes are connected to steam and exhaust chambers within the evaporating vessel, the means of access to the tubes for cleaning or removal being through hand-holes in the sides of the vessel, as, for example, the early designs of Messrs. Kirkaldy, of London, and Mr. Quiggin, of Liverpool.

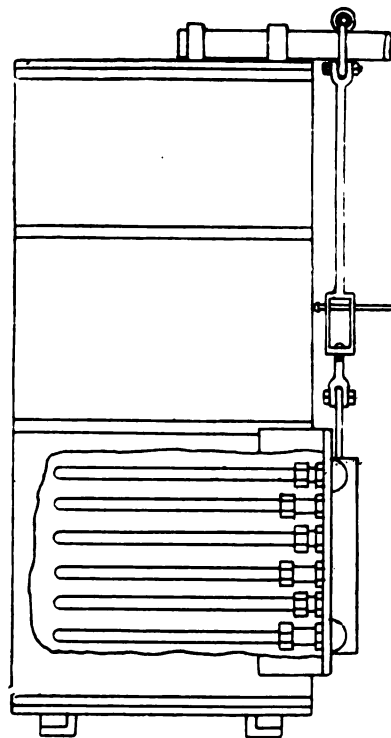


FIG VI

(2) The heating tubes are attached to the door in such a manner that on removal of the door the coils can be brought without the vessel for examination and cleaning, as, for example, the designs by Messrs. Weir, Rayner, Kirkaldy (1894), and Mudd.

(3) The heating coils are attached to the base or lower vessel containing the steam connections, the coils being covered by a dome which, on being lifted, exposes the coils, as in Morison's dome type.

(4) The heating coils are attached to steam and exhaust chambers within the vessel, such chambers being arranged to terminate in a trunnion, so that each coil can be revolved to a position opposite a door in the side of the vessel through which it can be removed, as in the design by the late Mr. Blair, of Stockton.

(5) The heating coils are independent of the door, and are arranged on arms terminating in trunnions, so that the entire heating surface can be swung without the vessel into a position for removal or cleaning, as in Morison's radial evaporator.

The early design of Mr. Kirkaldy, the well-known maker of feed heaters, distillers, &c., consisted of a vertical cylindrical

vessel, Fig. 3, within which were a number of spiral coils connected at their upper and lower ends to brass steam inlet and outlet chambers, access being obtained by two doors, one opposite each chamber. Mr. Quiggin's early design, Fig. 4, is somewhat similar in general arrangement, with special features of detail which have rendered it a very successful apparatus. Mr. Quiggin also manufactures multiple evaporators of very high efficiency, but although multiple effects are used in some large steamships, the system is by no means common.

The well-known evaporator of Mr. Weir, Fig. 5, consists of a horizontal cylindrical steel shell with two flanged ends, rivetted throughout and fitted with the usual mountings. The heating tubes are of U section and are attached to a tube plate, forming part of a hollow door containing the inlet and outlet chambers. Each tube is flanged at its discharge end, and the diameter of outlet reduced to a minimum in order to maintain the pressure within the tubes and so increase the efficiency of the apparatus.

Some very valuable experiments were made with this evaporator by Mr. Lang, who read an interesting paper on the subject before the Institution of Engineers and Shipbuilders of Scotland, in 1889.

Mr. Rayner's design, Fig. 6, consists of a vertical cylindrical vessel; the coils are attached to the door as in Weir's, but are in the form of volutes. Two valves controlling the supply to and from the steam and exhaust chambers in the door are fixed to the body of the evaporating vessel, and connections are made by co-incident ports in the flanges of the door and the vessel, so

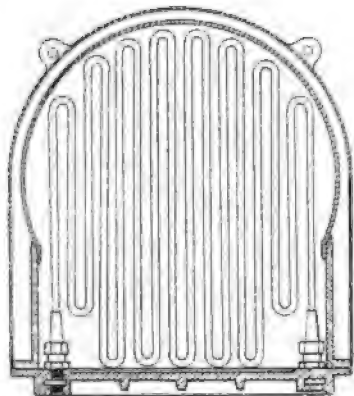


FIG. VII

that when the door is jointed in position these form a continuous passage. The arrangement is very convenient and does not necessitate the removal of any mountings when withdrawing the tubes. The door and attached tubes are withdrawn from the vessel by a simple overhead runner, the whole forming a very compact apparatus.

Mr. Kirkaldy's latest design is very similar in general detail, the coils being in the form of volutes connected to chambers in the door, the volutes being in pairs arranged in vertical planes, and not horizontal, as in Rayner's. Another modification is that manufactured by Messrs. Maudslay, as in Fig. 7.

Mr. Mudd has also adopted the same general arrangement, Fig. 8, except that the door is hinged, and U shaped tubes, in the form of arcs, are struck from the hinge of the door as a centre.

Morison's dome type evaporator, Fig. 9, is in the form of a vertical cylinder, the lower part or base having attached to it the spiral coils arranged in pairs. The upper portion is in the form of a dome, which on being raised is supported by standards, thus exposing the coils and enabling them to be readily cleaned.

The evaporator designed by the late Mr. Blair, Fig. 10, is in the form of a vertical cylinder with a door in the side. The coils are spiral and mounted on a trunnion base, so that each coil can be revolved opposite the door for examination or cleaning.

Morison's radial evaporator, Fig. 11, comprises a lower horizontally arranged water vessel, provided with a vertical cylindrical extension forming a steam dome. The lower part of the vessel is fitted with a door which is swung by a pivoted arm,

to which it is attached, into such a position as will enable the coils to be withdrawn. The heating coils are arranged in pairs and are detachably connected to two horizontal tubes, forming respectively the inlet for steam and the outlet for the resulting water of condensation. Each of these tubes is closed at its free end, and terminates at its other end in a cap mounted on a hollow plug, so that the tubes and the attached coils can be readily turned on the hollow plugs as a centre, and so withdrawn from the vessel for cleaning purposes, and afterwards swung back again, these operations being effected without breaking any steam connections. Should it be desired to replace a dirty set of tubes with a clean set, two nuts are removed from the plugs, and the inlet and outlet tubes with all the attached coils are lifted off, and the spare set lifted on. There are no flat-sided steam chests or jointed tube plates in this arrangement, all the parts subjected to boiler pressure being tubular, of brass and copper. Testing is also an easy operation, as by opening the steam valve and closing the drain the entire heating surface can be examined, and all the joints being in front are easily accessible for adjustment. In evaporators of large size the heating sur-

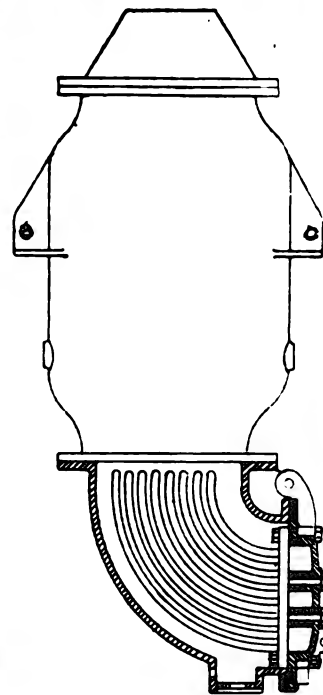


FIG. VIII

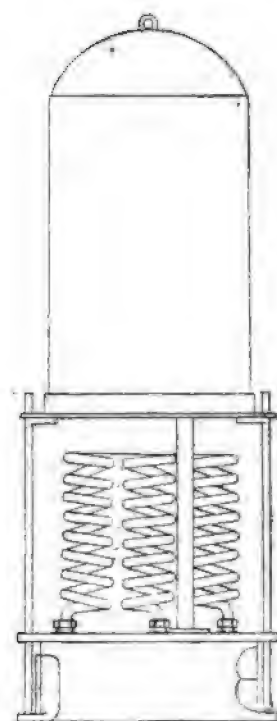


FIG. IX

face is divided into two sets, each set being independently mounted on the steam hinges or trunnions; the object of the arrangement being that each set of coils can be lifted by one man without the aid of any mechanical appliances.

In all the foregoing evaporators the contained water is simply boiled, but in the Yaryan apparatus the water is delivered in a fine spray through a series of tubes in direct connection with the condenser, and the resulting brine falling into a receiver is withdrawn by a special pump.

An evaporator being simply a boiler, the mountings are very similar.

Fig. 12 shows a special bye-pass drain cock which admits of continuous brining by an independent adjustment, which is not effected by the complete periodical blowing of the entire contents. Some makers allow the sea water to enter by gravity through a controlling float tank at the inlet, whilst others use a feed pump driven by the air pump lever. The writer favours the latter plan, as it renders the position of the evaporator in the ship independent of the sea level which, in shallow boats especially, is a distinct advantage. An evaporator naturally requires a little supervision and is consequently usually placed in a position on the lower platform, readily accessible by the engineers. In the event of it being placed in some out-of-the-way position, and



with a view of controlling the level from the starting platform, the arrangement shown in Fig. 13 may be adopted. This regulating device comprises a pipe connected at its lower end with the lower part of the evaporating vessel where the brine is densest, and at its upper end with the steam space: at the desired water level a branch pipe is taken to a float tank, which may be situated at any distance from and below the evaporator.

In these times of severe competition, when every detail on shipboard is viewed from a commercial standpoint, the probable cost of obtaining fresh water by means of an evaporator is a most important consideration. There are several arrangements available; as steam may be taken from the boiler direct, or from the receiver after having done work in the engine, and the steam generated in the evaporator may either be led to the condenser or to the hot well. In order to compare the relative economy of these methods, loss by radiation may be neglected, as it is practically a constant quantity; also for the sake of simplicity the usual tables on the properties of steam may be taken as applicable to the general conditions.

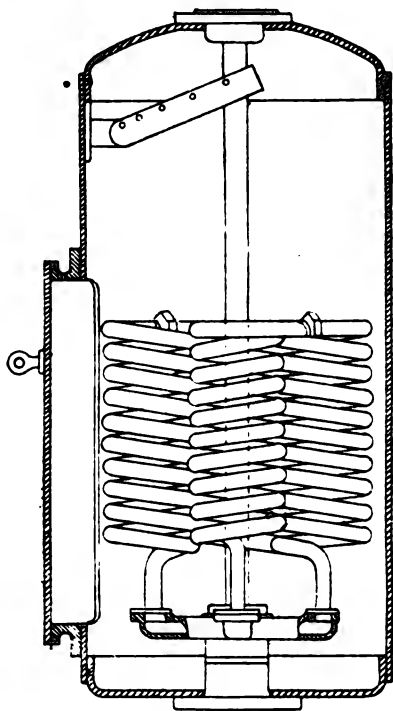


FIG. 9.

#### Steam supplied to the Evaporator from Boiler and Steam generated in Evaporator discharged to Hot Well.

In considering the method by which steam is supplied to the evaporator direct from the boiler, and the steam generated in the evaporator is condensed amongst the feed water in the hot well or its equivalent, let it be assumed that the pressure in the evaporator is 1 lb. per square inch, and that the water fed to the evaporator is taken from the circulating pump discharge at a temperature of 80° F. Experience has shown that evaporators at sea should be worked at a density of from  $\frac{1}{2}$  to  $\frac{1}{4}$ , but for purposes of calculation let us assume  $\frac{1}{2}$ , and in order to maintain that density in the evaporator one-third of the total amount of water fed to the evaporator must be discharged into the bilge or overboard, consequently to produce 1 lb. of pure steam  $1\frac{1}{3}$  lbs. of sea water must be supplied to the evaporator, of which 1 lb. is evaporated in steam and  $\frac{1}{3}$  lb. is discharged as hot brine, therefore the total heat required to make 1 lb. of pure steam is the sum of the heat in the steam and that in the discharged brine.

The temperature of steam at 16 lbs. abs. = 216.3° F.

The heat in 1 lb. of steam at a temperature of 216.3° from water at 80° F. ... 1099.4 T.U.

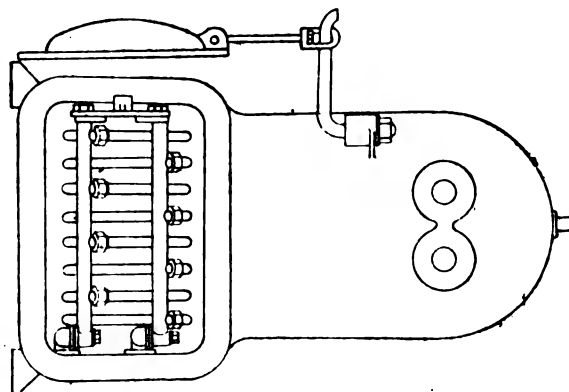
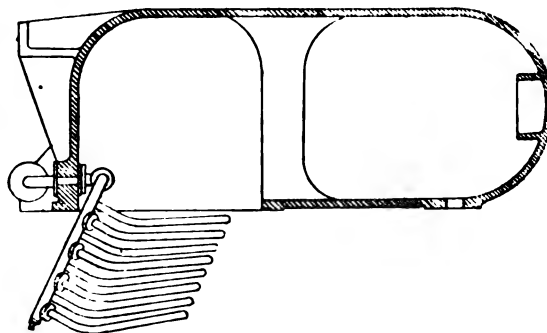
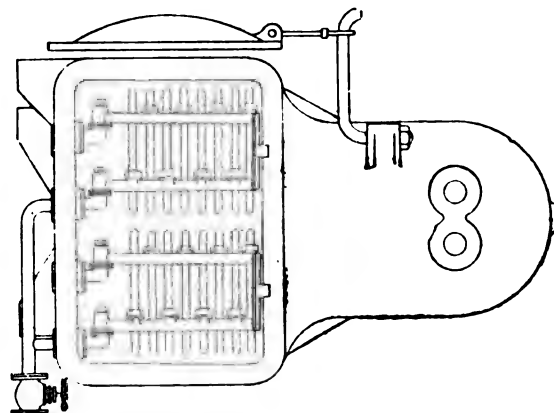
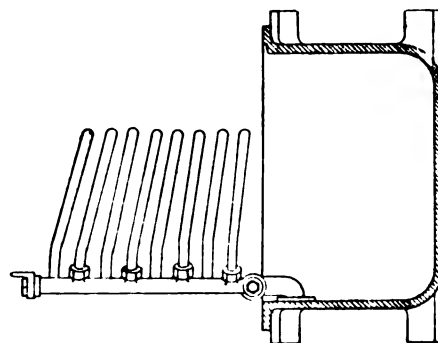


FIG. 10.



The heat in  $\frac{1}{2}$  lb. of brine at a temperature of  $216.3^{\circ}$  from water at  $80^{\circ}$  F. ... 68.1 T.U.

Therefore the total heat required to produce 1 lb. of pure steam ...  $1099.4 + 68.1 = 1167.5$  T.U.

As the generated steam is passed direct to the hot well and is entirely condensed amongst the feed water it gives up the whole of its heat, so the net cost of producing 1 lb. of steam is  $(1167.5 - 1099.4) = 68.1$  T.U., or, in other words, the actual expenditure of heat is that due to brining.

#### STEAM FROM BOILERS, GENERATED STEAM TO HOT WELL.

Received by evaporator.	Thermal Units.	Discharged by evaporator	Thermal Units.
Heat required to produce one pound of steam at a temperature of $216.3^{\circ}$ above $80^{\circ}$ ...	1167.5	Heat given up to hot well ...	1099.4
		Balance in brine ...	68.1
Total ...	1167.5	Total ...	1167.5

The calorific value of 1 lb. of good coal may be taken at 14,500 T.U., and by assuming the boiler efficiency to be 66.6 per cent. which was about the average result obtained on the trials of the Research Committee of the Institute of Mechanical Engineers, we have  $\frac{14,500 \times 66.6}{966.6} = 10$  lbs. of water evaporated from and at  $212^{\circ}$  F. per pound of coal, so that 966.6 T.U. will be obtained from the combustion of 1 lb. of coal, and the amount of pure steam generated by 1 lb. of coal with this arrangement will be  $\frac{966.6}{68.1} = 14.19$  lbs., or the amount of coal required to make 1 ton of pure steam  $\frac{2240}{14.19} = 15.7$  lbs.

ton of pure steam  $\frac{2240}{14.19} = 15.7$  lbs.

#### Steam supplied to Evaporator from Boiler and Steam Generated in Evaporator discharged to the Receiver of the Low-Pressure Engine.

In this case the generated steam from the evaporator is discharged into the low-pressure casing and does work upon the low-pressure piston before it is condensed. Again availing ourselves of the data contained in the report of the Committee already referred to, we find that in economical triple-expansion engines about 17 per cent. of the total heat in the steam is converted into work; for the sake of simplicity, however, consider the efficiency as 18 per cent., and assuming that the power developed in each cylinder is equal, one-third of this, or 6 per cent. of the total heat, is utilized in each cylinder; it therefore follows that 82 per cent. of the heat is rejected, that the amount of heat entering the low-pressure casing is 88 per cent. of the total supplied to the engine, and, of the total heat supplied to the low-pressure cylinder,  $\frac{6 \times 100}{88} = 6.82$  per cent. is converted into work.

Let the pressure in the low-pressure casing be 7 lbs. per square inch, and the temperature of the evaporator feed be  $80^{\circ}$  F., as in the previous case.

Temperature of steam at 22 lbs. abs. =  $233.1^{\circ}$  F.

Heat in 1 lb. of steam at a temperature of  $233.1^{\circ}$  F. from water at  $80^{\circ}$  F. ... 1104.5 T.U.

Heat in  $\frac{1}{2}$  lb. of brine at a temperature of  $233.1^{\circ}$  F. from water at  $80^{\circ}$  F. ... 76.5 T.U.

Heat required to produce 1 lb. of pure steam =  $(1104.5 + 76.5) = 1181$  T.U.

The equivalent weight of steam if taken from the boiler at 160 lbs. pressure and discharged from the evaporator coils at a pressure of 60 lbs. abs. or  $292.7^{\circ}$  F. would be:—

The temperature of steam at 175 lbs. =  $370.8^{\circ}$  F.

Heat in 1 lb. of steam at  $370.8^{\circ}$  above  $292.7^{\circ}$  = 933.7 T.U.

To produce 1 lb. of steam in the evaporator  $\frac{1181}{933.7} = 1.26$  lbs.

must be taken from the boiler.

Assuming that this steam had passed through the engine in the ordinary manner, and taking the temperature of the hot well at  $120^{\circ}$  F., the heat in 1 lb. of steam at  $370.8^{\circ}$  F. above  $120^{\circ}$  F. = 1106.4 T.U., so that if instead of being taken to the evaporator

it had passed through the engine in the ordinary manner, the amount converted into work would have been  $1106.4 \times 1.26 \times .18 = 251$  T.U., and of the heat passed from the evaporator to the low-pressure casing  $1104.5 \times .0682 = 75.3$  are converted into work, or  $\frac{75.3 \times 100}{251} = 30$  per cent. of the total useful heat had it passed

through the whole engine; therefore the available useful heat given off by the evaporator is  $1104.5 \times .30 = 331.3$  T.U. To this must be added the heat which is contained in the drain from the coils and which is led to the hot well, viz.  $(292.7 - 120) \times 1.26 = 217.6$  T.U.

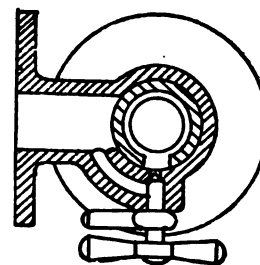
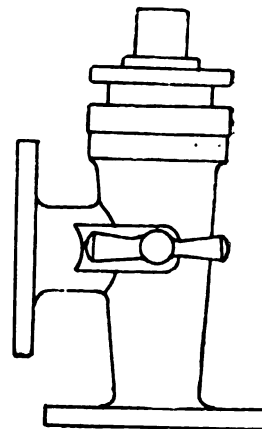


FIG. XII.

#### STEAM FROM BOILERS GENERATED STEAM TO LOW-PRESSURE CASING.

Received by evaporator.	Thermal Units.	Discharged by evaporator.	Thermal Units.
Heat in 1.26 pound of steam at a temperature of $370.8^{\circ}$ F. above $120^{\circ}$ F. $1106.4 \times 1.26$ ...	1394	Equivalent value of heat utilized in low pressure cylinder	331.3
		Heat carried forward to the hot well from coils ...	217.6
		Balance unaccounted for ...	845.1
Total ...	1394	Total ...	1394

The net cost of producing 1 lb. of pure steam is, therefore, the balance as above, and the amount of pure steam generated per pound of coal =  $\frac{966.6}{845.1} = 1.143$  lbs., consequently the amount of coal required to produce 1 ton of fresh water =  $\frac{2240}{1.143} = 196$  lbs.

### Steam supplied to Evaporator from Intermediate Pressure. Receiver and Steam Generated in Evaporator discharged to Hot Well.

In this arrangement steam is taken from the intermediate pressure casing (after having done work in the high-pressure cylinder) and employed in the evaporator to produce steam at a pressure of 1 lb. above the atmosphere, the evaporator steam being taken direct to the hot well and there condensed amongst the feed water. Let the data in this case be as follows:—Steam in the intermediate pressure casing at 60 lbs. pressure, temperature of evaporator feed 80° F., and temperature of the hot well 120° F. The heat required to produce 1 lb. of pure steam will be the same as in the first example, viz., 1167.5 T.U. Let the temperature of the discharge from the coils be that due to a pressure of 15 lbs. per square inch or (say) 30 lbs. abs.=250.4° F. Temperature of steam at 65 lbs. abs.=298° F.

Heat in 1 lb. of steam at a temperature of 298° F. above water at 250.4° F.=953.9 T.U.

Therefore, to produce 1 lb. of pure steam in the evaporator  $\frac{1167.5}{953.9} = 1.22$  lbs. of steam, which must be taken from the intermediate pressure casing, this on the basis explained in the second arrangement is equivalent to  $1.22 \times \frac{100}{94} = 1.3$  lbs. of boiler steam, the total heat per lb. above water at 120° F., being 1106.4 T.U. If, therefore, the heat contained in 1.3 lbs. of steam had passed through all the cylinders, 18 per cent. would have been converted into work, 6 per cent. or one-third of the effective heat being utilized in the high-pressure cylinder; the equivalent of the total heat is therefore  $1106.4 \times 1.3 \times \frac{1}{3} = 479.4$  T.U.

There is also the heat in the condensed steam from the coil or (250.4 - 120) 1.22=159 T.U.; and lastly, the steam formed in the evaporator being taken to the hot well and there condensed, it gives up the whole of its heat above 120°=1059.4 T.U.

#### STEAM FROM INTERMEDIATE-PRESSURE CASING GENERATED STEAM TO HOT WELL.

Received by evaporator.	Thermal Units.	Discharged by evaporator	Thermal Units.
Heat in 1.3 pounds of steam at a temperature of 370.8° F. above 120° F. $1106.4 \times 1.3$ ...	1438.3	Equivalent value of heat utilized in high-pressure cylinder ...	479.4
Surplus heat after allowing for heat in the brine ...	239.5	Heat carried forward to hot well from coils.	159
		Heat given up by generated steam to hot well.	1059.4
Total ...	1697.8	Total ...	1697.8

From the above statement it will be seen that there is a reserve of 259.5 T.U. beyond the expenditure of heat in brining. Expressing this in coal as before, the equivalent is 1 lb. of coal for the evaporation of  $\frac{9666}{259.5} = 37.2$  lbs. of pure steam; therefore, in producing 1 ton of fresh water, by employing an evaporator in this manner, there is a reserve balance in favour of the evaporator equal to  $\frac{2240}{37.2} = 60.2$  lbs. of coal. This theoretical result is based on perfect adiabaticity, and is greater than that which would be obtained in practice, as a large amount of heat naturally disappears by initial condensation.

### Steam supplied to Evaporator from Boiler and Steam Generated in Evaporator Discharged to Condenser.

In this arrangement it is customary to place a vapour or reducing valve between the evaporator and the condenser, the evaporation will therefore take place at about atmospheric pressure, the feed being at 80° F., as before.

Temperature of steam at atmospheric pressure 212° F.

Heat of 1 lb. of steam at 212° F. above water at 80° F.=1098.1 T.U.

Heat in  $\frac{1}{3}$  lb. of brine at 212° above water at 80° F.=66 T.U.

Heat required to produce 1 lb. of pure steam  $1098.1 + 66 = 1164.1$  T.U.

As the steam generated in the evaporator is taken to the condenser and there condensed, it forms 1 lb. of pure water at the hot-well temperature of 120° F., the total heat above 120° F. carried away in the circulating pump discharged at 80° F. being  $1058.1$  or  $1098.1 - 1058.1 = 40$  T.U., which represents the amount of useful heat sent to the hot well after condensation has taken place in the condenser.

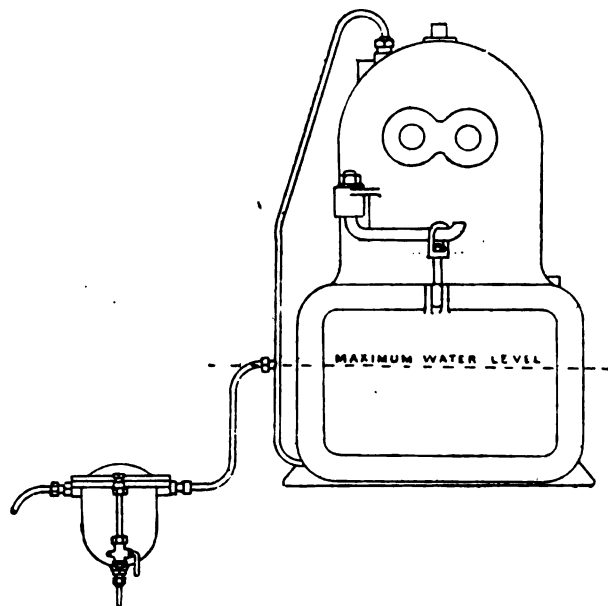


FIG. XIII

#### STEAM FROM BOILER GENERATED STEAM TO CONDENSER.

Received by evaporator.	Thermal Units.	Discharged by evaporator.	Thermal Units.
Heat required to produce 1 pound of steam at a temperature of 212° F. above 80° F. ...	1164.1	Heat given up by 1 pound of steam in condenser ...	40.0
		Balance of heat lost in circulating water ...	1124.1
Total ...	1164.1	Total ...	1164.1

The net cost of producing 1 pound of steam is, therefore, 1124.1 T.U., whilst the combustion of 1 pound of coal would produce 9666  $\div 8.6$  = 8.6 pounds, and 1 ton of fresh water would require  $\frac{1124.1}{2240} = 260$  pounds of coal.

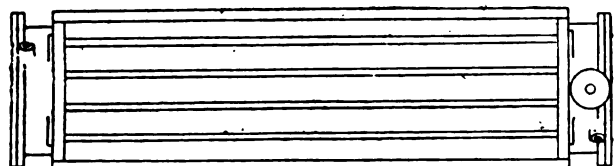


FIG. XIV.

These investigations show that water may be obtained from an evaporator for a nominal expenditure of coal or very wastefully, depending entirely on the arrangements adopted. The steam supply from the intermediate-pressure casing is more economical from a heat expenditure point of view than a direct connection to the boiler, but there are practical considerations in favour of the latter which will be referred to later. With reference to the steam generated in the evaporator, there is no doubt whatever that discharging direct to the condenser, although a cheap

method as regards the cost of fitting up the apparatus on board, is distinctly the most uneconomical which could be adopted, and although a connection to the condenser is sometimes convenient in port, yet at sea it should never be used, as it is simply equivalent to willfully throwing coals overboard. There is in the hot well a medium, viz., the feed water, which will readily absorb all the heat contained in the steam generated by the evaporator, and in such a manner that none of the heat so absorbed is wasted, consequently, to adopt any other method is sacrificing possible economy.

The condensing of the steam amongst the feed water naturally raises the temperature of the latter, but not to such a point as will influence the working of the feed pumps unless the design is very faulty. If any difficulty occurs a remedy is often found by making a connection by a  $\frac{1}{2}$  in. pipe between the top of the feed pump barrel and the condenser. In order to overcome certain objections to evaporating direct into the hot well, the writer has adopted an independent vessel, Fig. 19, which has given good results in practice. The vessel contains two chambers, one of which forms a receiver or well for the feed water on its passage from the hot well to the pumps. Projecting into this well is a nozzle with radial openings through which the steam from the evaporator flows, and by giving the water a centrifugal motion is rapidly condensed; any freed air escapes by an exit pipe, and the heated water overflowing from the well is drawn through the suction valve of the feed pump in the usual manner.

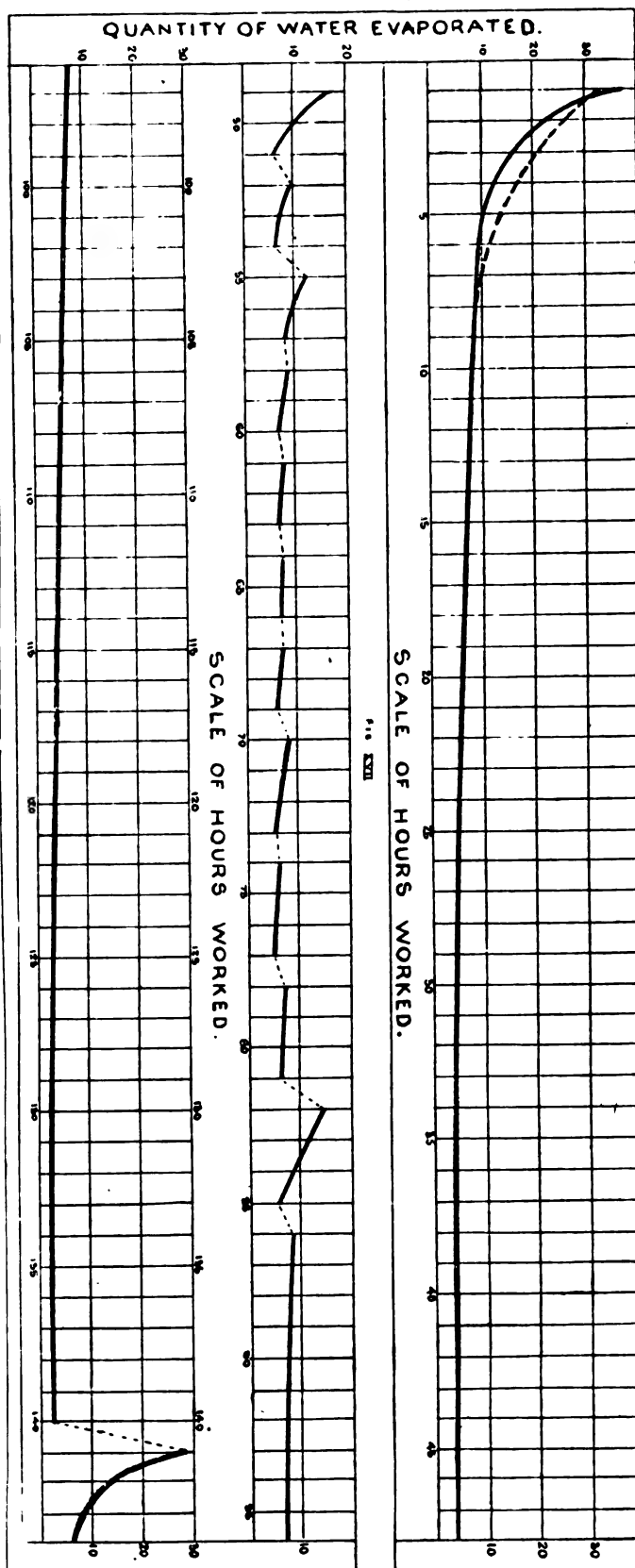
The effect of an accumulation of scale in boilers does not come within the scope of this paper, but, considered briefly, the results are:—

- (1) Decreased efficiency of the heating surface, causing an unnecessary expenditure of fuel.
- (2) Increased temperatures of the materials forming the heating surfaces, causing collapse or deformation of furnaces and leakage of tubes and joints.
- (3) Increased wear and tear of boilers.
- (4) Excessive boiler cleaning expenses.

Specimen was shown of scale taken from a boiler, which resulted in a very heavy repair bill and serious injury to the furnaces. It is very easy to understand that such a scale must have caused a great waste of fuel, but the rapid increase in the temperature of the furnace plates, when covered with but a slight coating of scale (especially when it contains oil), is not always fully appreciated until accidents happen, and for this reason a feed water filter is a valuable adjunct to an evaporator. Some very interesting investigations on boiler deposits have been made by Mr. Isaac, the consulting engineer for the Eastern Telegraph Co., who has given the subject careful study on account of the nature of the work of cable laying, necessitating boilers being kept under steam for long periods. In one boat, after 110 days' steaming, the boiler on being opened out was found perfectly clean, and only required the light powder with which the surfaces were covered brushing down and washing out. In another boat, after 103 days' steaming, a similar result was obtained. Each boat was fitted with an evaporator and an Edmiston filter, the boilers, of 160 lbs. pressure, being worked under Howden's forced draught, and in both cases zinc and soda were used. If boilers were treated in this manner, maximum efficiency is maintained, the expenditure of fuel, the cost of boiler up-keep and the expenses in scaling and cleaning being reduced to a minimum. An example recently came under the writer's notice, in which a boat brought all her furnaces down, yet the thickness of scale on the heating surfaces was by no means excessive. Subsequent analysis of the deposit gave the following extraordinary result:—

Gritty matter and sand...	...	2.69 per cent.
Oxide of copper ...	...	1.07 "
" zinc ...	...	3.42 "
" iron ...	...	24.21 "
" magnesium ...	...	16.52 "
" calcium ...	...	2.02 "
Oily matter of acid character, combined with oxides of copper, zinc, iron and magnesium ...	...	32.02 "
Oil in its natural state, but mechanically mixed through the deposit ...	...	17.98 "
Total ...	...	99.93 per cent.

This remarkable deposit contains, therefore, 50 per cent. of oil. The oil on being examined was found to have a vaporizing



point of 305° F. and was, therefore, altogether unsuitable for the internal lubrication of high-pressure engines.

The efficiency of the heating surface in an evaporator depends chiefly on the steam pressure within the tubes and the thickness of scale on the tubes. With a view of ascertaining the effect of scale, the following experiments were made. Fig. 14 is a vessel open at the top, within which are fitted ordinary condenser tubes terminating at each end in chambers for the inlet steam and outlet water of condensation, the latter being conveyed to a drainer so that full pressure could be maintained within the tubes. Dry steam was supplied to the tubes at a pressure of 45 lbs. per square inch, the water to be evaporated taken from the sea, and a density maintained of about  $\frac{3}{4}$  to  $\frac{1}{2}$  by continuous brining. As the intention was to ascertain the decrease in efficiency due to the formation of scale on a clean tube, every precaution was taken to maintain constant conditions in order that no scale might be cracked off by any variation in temperature.

The trial lasted 48 hours, all water being carefully measured and every provision made for obtaining accuracy. Fig. 15 gives the results; from which it is seen that the evaporation during the first hour was 32 gallons, falling rapidly to 8½ for the twelfth hour, and continuing to decline gradually to 4 gallons for the

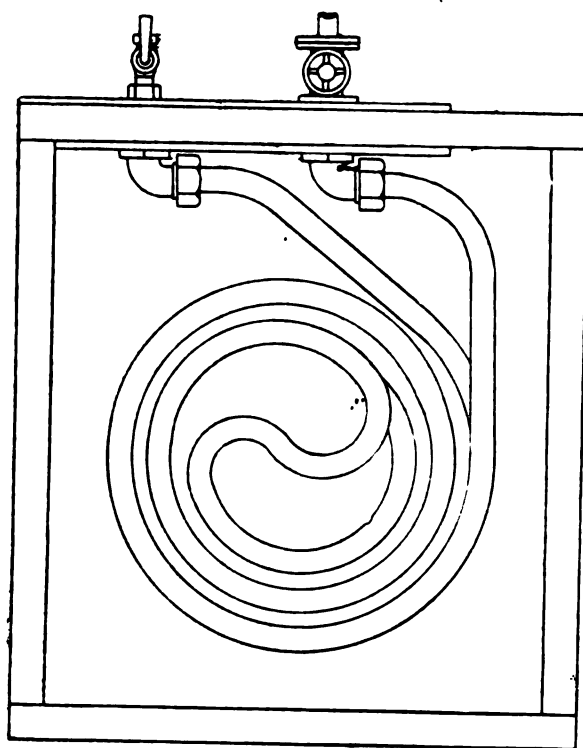


FIG. 15

forty-eighth hour. The initial drop being very rapid, it was suggested that water in suspension passed off with the steam; half the tubes were then taken out, and the experiment repeated with practically identical comparative results. At the end of the trial the scale was about  $\frac{1}{8}$  in. thick.

Fig. 16 illustrates another vessel, in which the heating surface is in the form of volute coils, and with which the same experiment was made with exactly similar results. The pressure within the coils and the temperature of the water outside being kept constant, there was no tendency for the scale to crack off, and at the end of the trial the coils were covered uniformly with scale  $\frac{1}{8}$  in. thick.

It will be noticed that the curves are different on Fig. 15 for the first few hours in the two experiments, this being due to the fact that the first vessel had a larger amount of contained water than the second, therefore the density of the latter rose more rapidly and scale formed more quickly. At the end of the forty-eighth hour steam was shut off, and after the water became cold it was drained away. Sea water was then admitted, and on steam

being turned full on a large amount of scale could be seen to crack off and fall to the bottom of the vessel. The effect of this is clearly shown on the diagram, Fig. 17, as, although the evaporation had fallen to four gallons during the forty-eighth hour, yet, after the coils had been subjected to this treatment, the evaporation rose at once to 17.

After three hours' working the water was again drained away, sea water admitted, steam turned on, and scale thereby cracked off, this process being repeated at intervals until the 81st hour, with the result that, although the evaporation had fallen to four gallons during the 48th hour of the continuous trial, yet, after a further 33 hours of intermittent working, it had risen to 6, which corresponds to the evaporation at the 20th hour of the continuous trial. At the end of the 81st hour the evaporator was blown down, cold water admitted, steam turned on for a few minutes, and then the whole of the water was drained off a second time. The result of this is seen at once in the diagram, Fig. 17, where it will be noticed the evaporation for the 82nd hour has risen to 15½ gallons.

At the end of the eighty-fifth hour a continuous trial of fifty-five hours' duration was made *without* brining in any way, and at the end of that time, that is, for the 140th hour, the evaporation had fallen to two gallons. On opening the evaporator it was found that a large quantity of salt had been deposited and that underneath the salt crystals, the coils were coated with scale 1-16th in. thick.

The above method of filling with cold water, admitting steam and draining off, was repeated, and a large portion of the scale cracked off, after which, the apparatus was closed up and the experiment continued for a further four hours, with the result that during the first hour the evaporation was 29 gallons, falling to seven for the fourth hour. The total time, therefore, that this trial lasted was 144 hours, and during the whole of this time the coils were not scaled by any mechanical means, the process of blowing down periodically being the only method adopted of maintaining the efficiency of the apparatus.

How long the efficiency could be maintained with this method of working the experiments do not show, but the natural inference is that the decrease in efficiency would be slow, especially if a greater pressure of steam was available; ultimately, however, it would be necessary to scale the tubes by mechanical means. It is for this reason that the writer advocates connecting an evaporator direct to the boiler, as not only is the maximum pressure of benefit if the coils are allowed to become heavily coated with scale, but there is also the advantage of the greater expansion and movement of the coils due to the sudden application of the full pressure, thereby materially increasing the tendency for the scale to crack off.

A double connection to the boiler and I.P. casing is, of course, the more complete arrangement, as the economy due to the use of receiver steam may be obtained when the evaporator is of ample size, and in fair working condition; whilst if the coils are dirty, or an extra amount of water is required, boiler steam is available.

Repeated instances have come under the writer's notice of where the coils have been encased in a solid block of salt or covered with a scale of exceptional hardness. Both these results are due to the careless working and insufficient attention to brining. It is necessary for success that the density should be maintained from  $\frac{3}{4}$  to  $\frac{1}{2}$ , as, if allowed to become too dense, salt will be rapidly deposited on the coils, whilst if the density is kept too low by excessive brining, not only is there a large amount of heat in the discharged water, but the scale formed on the tubes is very hard and difficult to remove. On account of the density of the water and the low pressure of evaporation, there is sometimes a slight tendency to prime, and for this reason a portion of the heating surface is usually kept above the water level in order to break up the bubbles and so preventing water, in the form of spray, passing off with the steam.

A connection to the condenser is very convenient after blowing down, as the vacuum enables the evaporator to be filled from the sea more rapidly when this is being done. Care should be taken to fully immerse the whole of the tubes before turning on steam, the excess water being drained away as soon as the cracking off process is completed. The detached scale should also be cleaned out frequently, as when present in suspension it increases the tendency to prime.

Evaporators are sometimes used as condensers for winches when in port, and certainly seem well adapted for the purpose. The cooling surface required is usually in excess of what is necessary for evaporating purposes, consequently an increased

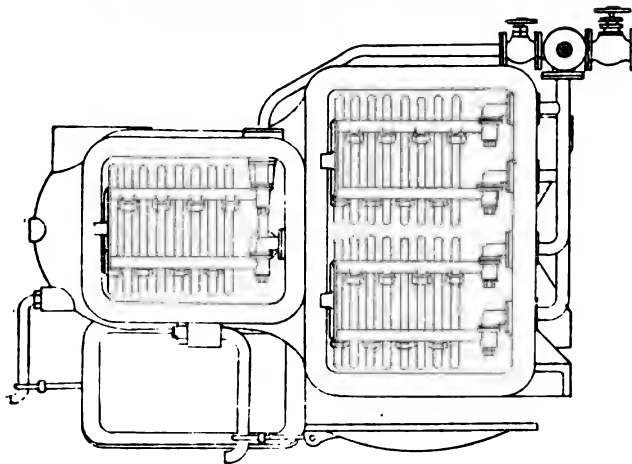
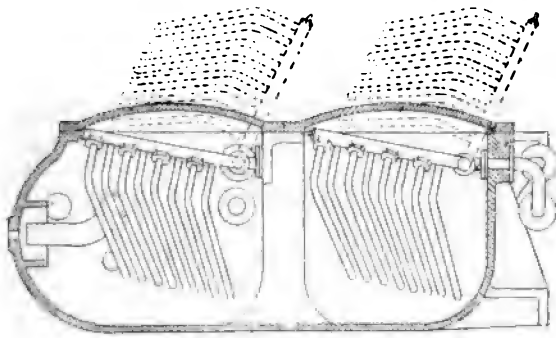
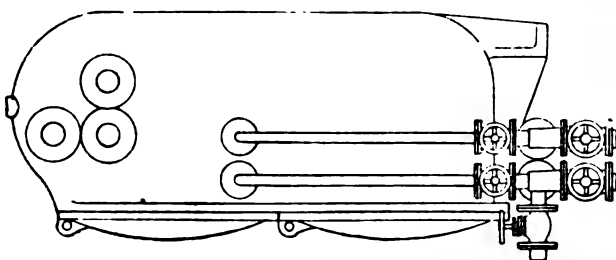
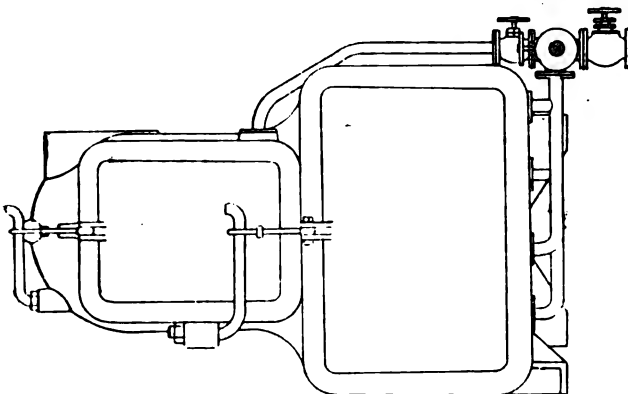


FIG. 19



size of evaporator has to be fitted. In order to minimize this increase in size, the writer has designed a combined apparatus, as in Fig. 18, the feature of which is the utilization of the steam space of an evaporator for the reception of a set of condensing coils, such set being a duplicate of the set of evaporating coils in the lower part of the vessel for which they are available when required. In the illustration the coils are divided into three similar sets. When evaporating, two sets are in use and one set available as spare; when condensing, this spare set is fixed in the steam space so that the available surface when used as a condenser is 33 per cent. greater than the surface when used as an evaporator. This extra surface in the steam space is also of value when it is desired to work the evaporator at its maximum, as it vaporises any water which may be in the steam due to violent ebullition, and would, therefore, be well adapted for war

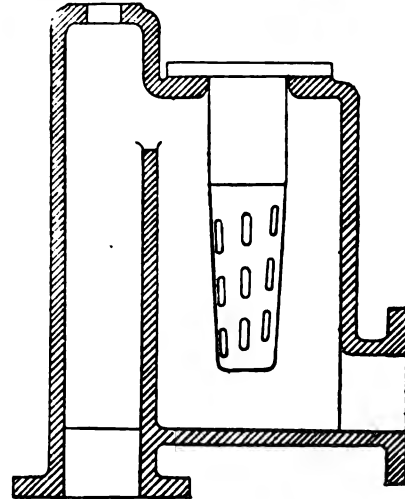


FIG. 22

ships or torpedo boats where reduction of weight is a great desideratum. On passenger and better class boats, winch condensers or exhaust tanks are a necessity, in order to overcome the delay and inconvenience caused by the escaping steam; but it is the donkey boilers which reap the great benefit, as, in cargo boats especially, they never have a large margin in size, and being fed direct from the sea, thereby causing an ever-increasing accumulation of scale, they constitute not the least of the worries on board a steamship. The question of first cost has been the obstacle, however; but now evaporators are an established necessity, it seems but a natural development that they should, with a little extra outlay, be rendered available for condensing purposes, and so materially add to the general efficiency. The writer had hoped to include the results of experiments with this apparatus, but as they are incomplete he will have pleasure in communicating them to the Institution at a later date.

### INDUCED DRAUGHT AS A MEANS FOR DEVELOPING THE POWER OF MARINE BOILERS.\*

By W. A. MARTIN, Esq.

INDUCED or exhaust draught has been adopted in various forms for many years, and has been employed especially on locomotives from the commencement of railways up to the present. It is the best known means of promoting rapid steam generation with safety.

The locomotive type of boilers has been largely adopted for marine purposes, but the system of working them has been reversed with very unfavourable results. The author, having made a large number of experiments in steam generation with

\* Read at the Thirty-sixth Session of the Institution of Naval Architects, April 5th, 1895.

all classes of boilers, is enabled to place before the meeting some particulars that may be interesting, both on forcing and inducing draught.

Although it has been sometimes maintained that so long as you create a difference in pressure between the air in the chimney and that in the stokehold, it matters not whether you exhaust from, or blow to, the fire; yet it will be seen, upon closer examination, that the characteristics of forcing and inducing are widely different. The forcing system is advantageously used for blasting down ores, and for iron foundry purposes, where the metal can fall below the blast as soon as melted; but it is an unsuitable process for puddling, reverberatory and reheating furnaces, such as are used in iron and armour plate making, where volume and steady heat are required. For these purposes exhaust or induced draught is used.

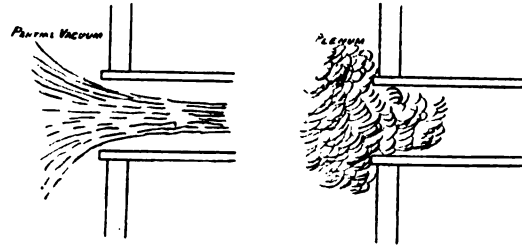
The marine boiler exposes a large amount of surface to be acted upon, and it is of primary importance that the heat should be evenly distributed over it, and not concentrated on particular parts. To effect this, the draught must have perfect control over the gases generated in the furnaces, as on the proper application of the draught the whole working of the furnaces depends. It is a tendency of the forced draught system, as used in the Navy, to concentrate and localise the heat. The initial effect of the draught is under the body of the fuel, and the gases generated are driven on without any controlling influence, whereas, with induced or exhaust draught, the initial effect is on the top of the fuel, and the gases evolved are under control of the draught until they are passed through the funnel. The effect of the draught is constant, the gases become perfectly developed and consumed before leaving the tubes, hence a lower temperature in the uptake and funnel, and comparative absence of smoke with induced or exhaust draught.

The author is indebted to the Admiralty for permitting an extensive series of experiments upon his system to be carried out on board H.M.S. *Gossamer*, at Chatham. This ship had been fitted and worked with forced draught prior to these experiments. There are two boiler rooms identically similar, and two boilers in each, of the locomotive type. The forward boilers were selected for the application of the induced draught system, which was fitted in the uptake forward, leaving the stokehold in its original condition, with the air-locks and other forced draught fittings unnecessary for induced draught. The air-locks and hatches, however, were left open during the trials, and in this respect only was there any difference in the working of the two systems.

The following table gives a summary of the trials that were carried out. It will be noticed that the power produced by the boilers with the induced draught system was far in excess of that developed under forced draught; also, that in point of economy, induced draught was greatly superior. The table is by no means exhaustive, as there are other points not noted, such as the greatly lessened temperature both in stokehold and funnel, the immunity from dust, and the freedom of ingress and egress in the stokehold:—

It will be seen that the trials on board the *Gossamer* confirm and verify those which were made in the *Polyphemus* boiler. In the case of the *Gossamer* especially, it was found that with forced draught the boilers could not be worked at anything approaching the rates attained by induced draught without priming taking place, for which reason the final trial of forced draught had to be abandoned after six hours' run.

It has been observed that the boilers of the *Gossamer* had been worked under forced draught previous to the experiments here recorded. It should also be added that they had been damaged and weakened to a considerable extent. It was therefore necessary in both the induced draught and the forced draught trials to use more care and caution than would otherwise have been necessary, but the author's experience is that very high rates of steaming may be practised with induced draught with perfect safety, as the tube ends and other surfaces are protected by the partial vacuum which takes place, and within a certain limit it may be said the greater the speed of draught the greater the immunity from damage to the boiler. The author has driven an ordinary marine boiler to the utmost limit that the coals would endure without producing the slightest injury to the tubes or any part of the boiler. The heat is drawn off rapidly and distributed over the whole surface of the tubes, observations taken proving that there is very little difference in temperature either at the front or back part of the tubes. This uniformity of temperature is an important factor in generating dry steam. Another important point in favour of induced draught is the saving in weight in comparison with forced draught. The iron-work involved by the latter for casing and air-locks in a first-class battleship is about nineteen tons. This is dispensed with by the induced draught system. The economy of fuel effected also tells in connection with weight. For instance, reverting to the *Polyphemus* trials, it is therein demonstrated that with the coals burnt in the 96 hours under forced draught, the boiler could have steamed 112½, at the same time exerting an excess of 81 H.P.



It will be seen that by the action of induced or exhaust draught, the heat is drawn off without being allowed to expend its force locally. It should also be observed that the principle of induced draught renders it quite independent of the length of funnel. In

EXPERIMENTS AT CHATHAM WITH BOILERS ON BOARD H.M.S. "GOSSAMER."

Date of Trials.	Description of Trials.	Hours.	I.H.P.		Revolution of Fans.		I.H.P. per foot of Grate.	Grate Surface.	Lbs. of Coal per I.H.P.	Lbs. of Coal per square foot of Grate.
			Intended.	Actual.	Starboard.	Port.				
1893.										
March 6 and 7 .....	Induced draught	30	1,250	1288.11	369	383	16.3	79	1.92	31.3
May 1 to 5 .....	Forced draught	96	750	710.69	219	214	8.99	79	2.32	20.87
1894.										
February 7, 8, and 9 ..	Forced draught	48	750	772.64	310	304	9.77	79	1.87	18.29
February 14, 15, and 16.	Induced draught	48	750	825.81	258	268	10.45	79	1.68	17.56
February 22 and 23 .....	Induced draught	24	1,000	1004.04	410	426	12.709	79	1.60	20.36
February 27 .....	Forced draught	6	1,000		Trial abandoned on account of priming.					

Grate surface, 143.32 sq. ft.; tube surface, 5,772 sq. ft.; No. of tubes, 1,728, length, 7 ft. 1½ in; diameter, 1½ in.

It may be mentioned that the above trials were arranged by the Admiralty as a more crucial test, and to institute a comparison with experiments made some time previously on a boiler of the same kind which had been taken out of H.M.S. *Polyphemus*. The following is a record of the results of the 96 hours' run which took place with each system on that occasion:—

fact, the funnel may be dispensed with altogether, so that in the case of a war vessel, if the funnel were shot away in action, it would not in any way affect the facility of steaming. The appended sketches convey an approximate idea of the flow of the gases as they enter the tubes under a partial vacuum, in the one case, and with forced draught in the other.



## EXPERIMENTS AT PORTSMOUTH DOCKYARD WITH BOILER EX H.M.S. "POLYPHEMUS."

Date of Trial.	Description of Trial.	Duration of Trial.	Average Pressure of Steam.	Temperature.		Revolutions of Fan.	Total Coals consumed in lbs.	Total Water evaporated in lbs.	Lbs. of Water evaporated per lb. of Coal.		Lbs. of Coal consumed per sq. ft. of Grate per hour.	Water evaporated for square foot of Grate per hour.		I.H.P. Approximate.	Lbs. of Ashes.	Lbs. of Clinkers.
				Feed.	Atmosphere.				At actual Temperature.	At 212°.		At actual Temperature.	At 212°.			
1890. Aug. 5 } to 9 } Oct. 28 } to } Nov. 1 }	Induced Draught	96 hrs.	74.2	62	69.9	485	80,600	777,044	9.64	11.13	40.4	389.6	450.37	426	3,628	1,202
	Forced Draught	96 hrs.	77.3	51	49.8	372	94,500	759,338	8.08	9.3	47.3	381	444	395	3,804	1,897

Length of tubes between tube plates, 8 ft. 6 in. Number of tubes, 258. Diameter,  $1\frac{1}{2}$  in. outside. Area of fire-grates, 20.77 square feet. I.H.P. of fan engine, 1.38 per cent. of power produced.

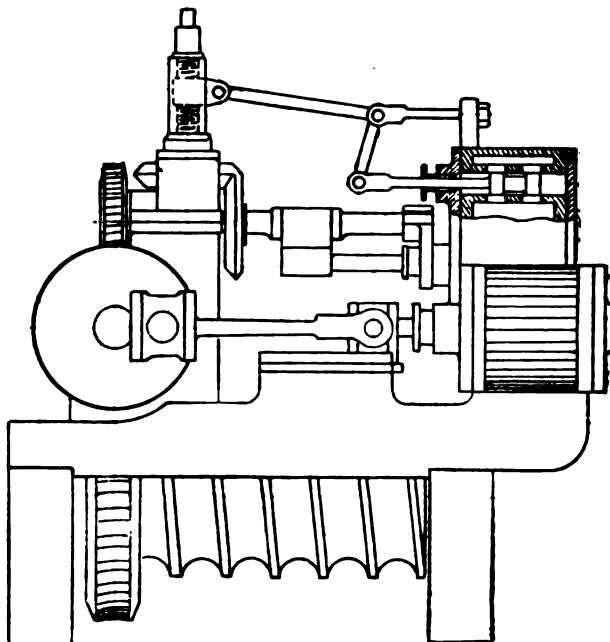
In this case both series of experiments were conducted on the same boiler, the induced draught installation being dismantled after trial and substituted by the forced draught system.

It is remarkable that while the forced-air system results in diminishing economy as the blast is raised, and there is a maximum pressure beyond which it is difficult to work at all, the induced system, on the contrary, gives an increased draught with no limit but the convenience of obtaining high speed of fan. The gases, being drawn through the tubes instead of being forced, are more perfectly consumed, and there is no lodgment of ashes in the tubes. So regular is the process of combustion that the quantity of coal consumed does not increase in anything like the same ratio with an augmented rate of working.

creases, while, when the helm is at or near the mid-position, very little steam is admitted to the engine, only just such a quantity being allowed to pass as will drive the engine at a sufficient speed for efficient steering. It will be seen from the illustration that the valve is operated by a bell crank lever, one arm of which is connected to a nut, worked by the helm indicator. It is claimed that this device saves about 50 per cent. of the steam under ordinary circumstances; that the steam supply varies with the load; that the

## DAVIS'S PATENT CONTROLLING VALVE.

IT is well known to anyone who travels to any extent upon steamers, that the steering engine in many cases is one of the noisiest devices in the ship compared with the work done by it, and engineers are fully aware of the extremely low mechanical efficiency of the engine as a motor having regard to the amount of steam used. The latter result is mainly brought about by the fact of the load on the engine at the mid-position of the rudder and that of extreme helm is widely different. The engine, however, has to be designed to deal with the greatest load at the pressure available, and as the engine for the greater part of the time is working at or near the mid-position of the rudder, when the least load is felt, the pressure of steam upon the engine is much greater than it need be. The consequence of this is that the pressure of the exhaust steam is high, and the loss from this source is great, as it also is from energy absorbed by friction in the engines by its being operated at a much greater velocity than is necessary, which causes heavy strains on the working parts, excessive vibration, and often difficulties in way of efficient lubrication. We have pleasure in bringing to the notice of our readers a device for overcoming the before-mentioned disadvantages, the application of which to a steering engine we illustrate in the adjoining illustration. It will be seen, that a valve arranged over a double-ported seating, is fitted on the slide case of the engine just above the ordinary controlling valve. This valve is automatically operated in conjunction with the travel of the tiller, in such a way that more steam is admitted to the engine as the helm goes over and the load in-



engine is more under control, and therefore a truer course can be kept; that the shock of admission of steam is lessened, and therefore, the engine will run more smoothly, no reducing valve is necessary; and lastly, that the device can be fitted to existing machines.

The arrangement is manufactured by Messrs. Davis & Co., Limited, engineers, of Garford Street, Poplar, E., and 12, Fenchurch Street, London, E.C.

## TORPEDO-BOAT DESTROYERS.

At the Ordinary Meeting of the Institution of Civil Engineers on Tuesday, April 2nd, 1895, Mr. W. H. Preece, C.B., Vice-President, in the Chair, the paper read was on "Torpedo-Boat Destroyers," by Mr. John I. Thornycroft, F.R.S., and Mr. Sydney W. Barnaby, M.M.Inst. C.E.

Until the year 1885 the British Navy possessed no vessels specially designed to destroy torpedo-boats. In that year a number of small vessels of about the same size and speed as the torpedo-boat, but intended to have a greatly superior gun armament, were ordered to be built for the purpose. They were of about 65 tons displacement and had a guaranteed speed of 19 knots. Before completion the original intention of using them as catchers was abandoned, and they were fitted as torpedo-boats. A new class represented by the *Rattlesnake* followed, having the same speed but with a displacement of 550 tons. This was succeeded in turn by the *Sharpshooter* class of 735 tons, by the *Speedy* class of 810 tons, and by the *Halcyon* class of 1,070 tons. The speed of each was from 19 to 20½ knots.

The growth in size of the catchers or torpedo-gunboats, although conducting to greatly improved seaworthiness, had not been accompanied by much increase of speed, while the speed of the torpedo-boat had advanced rapidly. These little vessels, of which the first was built for the Norwegian Government, by Messrs. Thornycroft in 1873, commenced with a speed of 15 knots. The torpedo-boat of the present day had a speed of from 26 to 27 knots, or as much as 7 knots in excess of the speed of the gunboat in smooth water. The advantage rapidly disappeared in a rough sea, and the gunboats would doubtless prove formidable foes to torpedo-boats in many conditions of weather. The want had, however, been felt of vessels having a speed equal to that of the fastest torpedo-boats in all weather, and it had been supplied by the introduction of a new type known as torpedo-boat destroyers. These were practically enlarged torpedo-boats, carrying a very powerful gun-armament. Forty-two had been ordered, and the speed of those which had been tried varied from 26 to 29 knots. The *Daring*, constructed by Messrs. Thornycroft, was fully described. Her total weight was approximately equal to the weight of the machinery of the *Halcyon* class, but her I.H.P. was 31 per cent. more than that of the *Halcyon*.

The metacentric height of the *Daring*, with all sea-going weights on board, was 2·21 ft. and 2·58 ft. with bunkers full and empty respectively. In the mean condition, the maximum righting-moment occurred at an angle of 46°, and stability vanished at 95°. At full speed the height of the metacentre was reduced by about 2 in. by the change of waterline. Calculations of the bending moments produced when the *Daring* was alternately supported upon a wave-crest and in a wave-hollow showed that the greatest stresses were produced by the latter condition, and amounted to 6·4 tons per square inch upon the material of the deck. She had two side-balanced rudders, and turned a complete circle ahead in 1 min. 28 secs., and astern in 3 mins. 30 secs.

There were twin-screws, driven by two sets of four-cylinder engines, using steam of 210 lbs. pressure, and having a piston-speed of over 1,000 ft. per minute. The engines were of novel design, specially adapted to run at high speed, with little friction or vibration. The cylinders were slightly inclined and had adjacent cranks nearly opposite, so as to completely balance the vertical reactions of their pistons, thereby reducing greatly the load on the main bearings and consequent friction. The curve of indicated thrust showed that the initial friction was unusually small.

The distortion of an ordinary three-throw crank was compared with what took place in the cranks of the *Daring*, and it was shown that the latter tended to preserve its true line, while the former, by tending to distort, threw much useless pressure upon the main bearings. With a view to lightness and simplicity, the cylinders were unjacketed. The circulation of water through the condenser was partly effected by the natural flow due to the velocity of the vessel through the water.

The boilers were three in number, of the Thornycroft type, each having two furnaces. It was necessary to arrange for about an equal power in much less space than was available in H.M.S. *Speedy*, and three of the *Daring* boilers did the work of eight of those of the *Speedy*. In order to obtain a regular feed, automatic gear was introduced, the very rapid rate of evaporation making hand regulating difficult.

Some difficulty was experienced with the propellers during the early trials. The *Daring* was at first fitted with a pair of screws

having blades of elliptical form, the minor axis of the ellipse being  $\frac{1}{4}$  of the major axis. Very unsatisfactory results were obtained, the slip at the higher speeds rising rapidly, and reaching as much as 30 per cent. at 24 knots. The authors considered that the bad performance of the screws was probably due to the fact that too large a thrust was required from them per unit of area. The greater part of the acceleration of the screw-race was always produced by negative pressure on the forward side of the blades. If the whole thrust of the screw were divided into two parts, one part due to negative pressure on the forward side, and the other to positive pressure on the after side, the negative pressure exceeded the positive pressure in all cases except the limiting one, in which no rotation was given to the race, a condition in which they became equal. The only force available for producing this acceleration in front of the screw was gravity. The recession of the helical surface as it revolved relieved the pressure of the water upon its forward face, and the water could only follow it up with the velocity which was due to the head above it. At the very small depth below the surface at which the screws worked in the *Daring*, a few inches only, the weight of water over them might almost be neglected and the head taken as that due to the atmosphere. The maximum thrust which could be obtained from the acceleration produced by atmospheric pressure close to the surface of the water was therefore 15 lbs. per square inch. It was estimated that the mean negative pressure per square inch of the projected blade-surface of the screws amounted to 8½ lbs., but as the thrust at the roots and round the edges of the blades was probably below the average, so there would be parts of the blade at which a greater negative pressure would exist. This, in fact, might approach more nearly to a state of things in which the pressure was so low that cavities formed behind the screw-blades filled with air and vapour boiled off from the water. A pair of screws were made of the same diameter and pitch as those first tried, but of greatly increased blade-area, and these gave satisfactory results, the slip at 29½ knots being only 15½ per cent. At a speed of 24 knots the slip as compared with that of the narrow-bladed screws was reduced from 30 per cent. to 17½ per cent. and the I.H.P. fell from 3,700 to 3,050. The revolutions required to obtain 24 knots with the narrow screws gave 28·4 knots with the wide ones. From analysis of a progressive trial of the *Daring*, it appeared that "cavitation" did not commence suddenly, but appeared to become detrimental when the mean negative pressure exceeded about 6½ lbs. per square inch, or when the whole thrust exceeded 11½ lbs. per square inch. This was with blades of elliptical form; it would probably vary somewhat when the surface was differently distributed. These results were corroborated by the trials of two torpedo boats in which a great saving of power was effected by reducing the mean negative pressure on the blade-surface from 9·9 lbs. per square inch to 6½ lbs. by widening the blades. The authors believed that the speed of vessels had now approached within measurable distance of that at which propulsion by screws became inefficient. For a given pitch-ratio and slip the thrust per unit of area varied as the square of the speed. Cavitation could only be avoided at very high speeds by increasing either the immersion of the screw or its blade-area. Immersion was limited by considerations of draught. Increased area could be obtained in three ways, (1) by increasing the ratio of surface to disk-area, (2) by employing a larger diameter than that theoretically best for the given conditions, (3) by increasing the pitch-ratio which involved a larger diameter with a reduced rate of revolution. Either tended to a waste of power if pursued beyond somewhat narrow limits, and it appeared inevitable that reduced efficiency must be submitted to as the speed of vessels was increased.

**Patent Valve Attachment.**—Mr. E. R. Hough, 101, Leadenhall Street, London, E.C., has lately put on the market a new device, designed to prevent the hammering and consequent injury to main feed check valves and the vibration of feed connections. This arrangement permits of a full lift being given to the valve, and consequent removal of excessive strains on pumps and pipes. The greatest success has attended the use of this valve attachment, the valves having become silent and showing no sign of wear, and this in cases where previously the valves had hammered themselves to pieces. As no alteration is required either to chest or valve, it can be readily fitted, and this, combined with its small cost and efficiency, should secure for it a very general application.

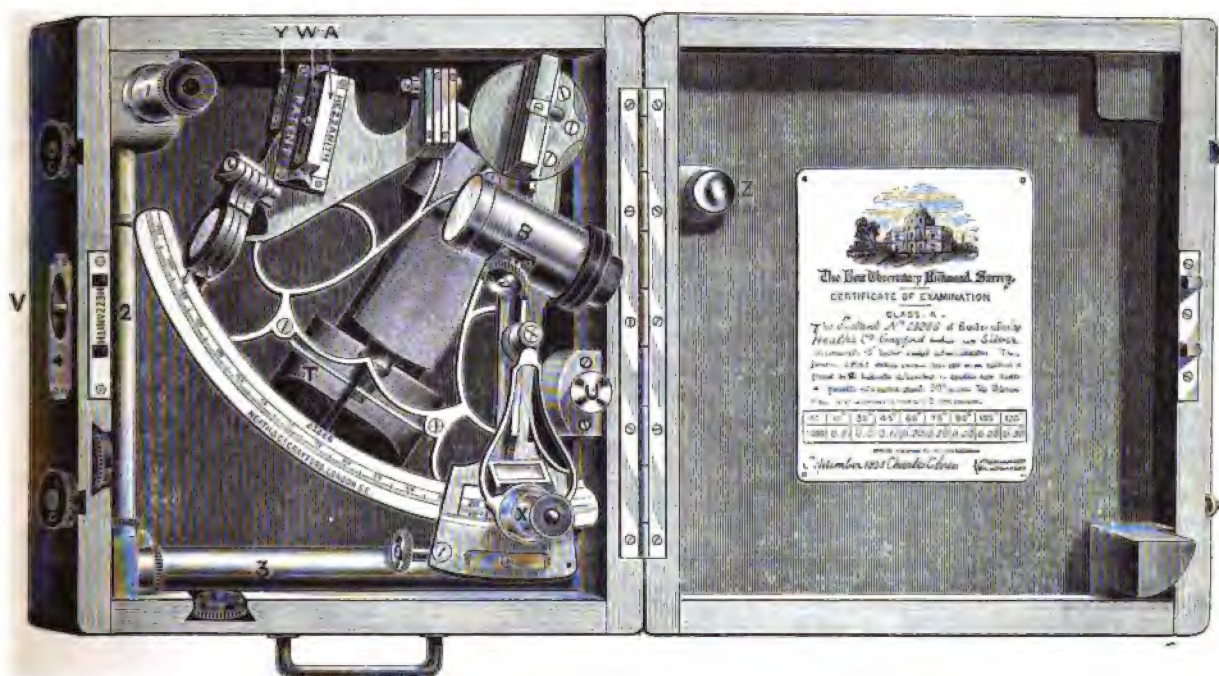
## THE "HEZZANITH" SEXTANT.

IN our issue of February, 1894, we described and illustrated a sextant that was brought out by Messrs. Heath & Co., Limited, of London and Crayford, which was designed to meet the requirements of the then latest "Extract from Admiralty Regulations respecting cadets whilst under training."

We have now pleasure in bringing to the notice of our readers this instrument, as it is now made and brought up to date to comply with the latest Admiralty requirements issued in October, 1894. The instrument is illustrated in the adjoining diagram, from which it will be seen that the improvements consist in, firstly, the arrangement of the object glass of enlarged size, upon a mounting B, which is fitted with a rack and pinion adjustment, enabling the focus of the

of the instrument are made with the key Z held in the case; and the case itself has an automatic spring lock, so arranged that as soon as the lid is pressed down to the closed position the case is locked without any other fixing; but to further secure it the front of the case is fitted with ingeniously made circular hooks C, which form secure and reliable fastenings to keep the case closed. An adjustment key Z is disposed in a socket in the lid of the case ready for use when required.

The arrangement of the telescope tubes is extremely convenient, as the one selected is slid into the mounting up to a shoulder, and if not quite in focus when pressed home, the milled head at B is slightly revolved until the focus is obtained. Thus the unsatisfactory and tedious operation of sliding the draw tubes of the telescopes until the focus is adjusted is



telescope to be obtained with great nicety and facility. This fitting is adapted to fit any of the telescope eye-pieces that are sent out with the instrument, which are three in number. The eyepiece marked 1 in the illustration being for the star telescope, that marked 2 for the extra-power telescope, and that marked 3 for the inverting telescope.

Any or either of these telescope eye-pieces can be slid into the mounting B carrying the objective. The cut and covered horizon glass A and index clips have special spring fixings W, so arranged as to avoid bending the glasses by the pressure of fixture, the vertical and horizontal adjustment being made by a box Y. The instrument is held in the hand by means of the strong bridge handle T. An automatic spring catch U is adapted to hold the sextant firmly in its case. A swing index reader X, with lens, is mounted on the arm for reading off the arc and vernier, so that the observer may change its angle to suit the light, or so set the glass central with any part of the dividing that parallax is avoided. All the adjustments

abolished, and rapidity, ease, and accuracy of focus by this new method is substituted. There are no fastenings to undo in order to obtain either of these three telescope tubes as the closing and opening of the lid of the case secures and releases them automatically.

Two separate eye-heads are included, which are fitted conically on the telescopes to enable a rapid change of eye-head to be made. The use of these dark glass eye-heads is advised when possible; and shade glasses are necessary, as owing to their position on the telescope, and the position of the telescope on the instrument, any defects in the parallel glasses are not magnified. In using the shade glasses which are fitted on the limb of the sextant, and thus in front of the telescope, every defect is magnified.

A new type of steam vessel for river traffic has been introduced at Havre, in which the power for the propeller is obtained from a gas engine. A French syndicate has been formed for building marine gas engines.

## BELFAST INDUSTRIAL EXHIBITION.

(From our own Correspondent.)

No. I.

THE Belfast Industrial Exhibition, opened on the 11th April by Lord and Lady Londonderry, is even now an assured success financially, the attendance up to the date of writing being about 60,000. The object of the exhibition is to wipe off the debt on the Working Men's Institute. The committee engaged the services of Mr. Philip Shrapnel as manager, and anyone will see that they are to be congratulated on their choice.

Mr. Caldwell, C.E., was instructed by the committee in charge of arrangements to prepare plans for the object, the White Linen Hall and grounds having been lent by the Corporation for the purpose. Mr. Caldwell having submitted his plans, Messrs. Fitzpatrick Bros. were appointed contractors. The space at the disposal of the committee was 370 ft. by 290 ft., and this was covered in by a wooden building in five spans with glass skylights. The old offices of the Linen Hall were all made into art gallery, amusement rooms, refreshments, &c.; the new buildings contain the machinery besides all the leading local industries and foreign exhibits.

The electric lighting arrangements were entrusted to Messrs. W. Coates & Son, of Belfast; the building is well illuminated at night by 10 3,000 C.P. arc lamps and 95 2,000 C.P. arc lamps (Crompton's patent), 1,600 16 C.P. incandescent lamps, also a 16,000 (60 amperes) search-light placed on the highest point outside the building.

Six of the dynamos (by Holmes, of Newcastle) to supply the current are driven by gas engines of the following well-known makes:—Tangyes, Crossley, Midland, Stockport, Robey and Aome. The dynamos are capable of supplying 180 amperes by 115 volts, and are worked in the exhibition at 140 by 115. One dynamo, driven by steam engine (Victor Coates & Co., Belfast), has an output of 350 amperes by 115 volts.

The current for the search-light is supplied by a Holmes' dynamo, driven by a Dick, Kerr gas engine, and has an output of 80 amperes by 115 volts.

The current is taken from the main switchboard by eight pairs of mains to the four corners of the building,—the mains consist of bare copper strips laid in china insulators. There is a distributing board at each corner of the exhibition, and the lamps are divided into 26 circuits—14 circuits of 2-arc lamps in series, and 12 circuits of incandescent lamps.

The fitting up of the entire installation, which is the largest indoor one ever executed in Ireland, was under the personal supervision of Mr. S. Dashwood, Messrs. Coates' clever engineer, and he has every reason to be proud of his undertaking.

Leaving the buildings and coming to the exhibits, which are numerous and interesting, anyone paying a visit to the exhibition will see that engineering is well represented in all its branches.

Messrs. Crossley Bros., Limited, of Manchester, show some very fine specimens of their skill in the manufacture of gas engines. They show a 14 H.P. nominal gas engine, giving 35 effective, driving a Holmes' dynamo for lighting purposes. This engine is built on the patent scavenging principle, their latest patent, which saves from 7 per cent. to 10 per cent. in consumption of gas over any of their previous makes. This fine motor has proved itself the steadiest in the exhibition, and any engineer will see by looking at the electric indicator on the switchboard that it scarcely varies any, in fact less than the steam engine. This speaks volumes for Messrs. Crossley's skill, and shows to what perfection they have brought their engines. This engine is fitted with Messrs. Crossley's patent self-starter.

They have also a stand where they exhibit a 7 H.P. nominal gas engine giving 16 effective, built on the scavenging principle, and is used for driving looms in the exhibition. There is also a 1 H.P. nominal gas engine, giving about 4 effective, and in addition they have a 2 H.P. oil engine built after the model of the gas engines.

Messrs. R. Carswell & Son, Belfast, are the sole agents in the North of Ireland for Messrs. Crossley Bros., Limited.

Furnival & Co., of Manchester, exhibit two of their Wharfedale printing machines, a platen machine, and a patent guillotine for paper cutting. These machines are being worked by Messrs. Carswell, Belfast.

Messrs. J. E. H. Andrew & Co., Limited, of Reddiah, near Stockport, are well represented in the exhibition with their well-known "Stockport" gas engines. They show a 14 H.P.

nominal driving a Holmes' dynamo. This engine is capable of giving 33 H.P. It is fitted with their patent self-starter. The "Stockport" engine has in this exhibition, as it has in all others, proved itself a very reliable machine, for out of the eight engines in the exhibition the "Stockport" was the only one that could be got to run from five in the evening till six next morning during the late working previous to the opening of the exhibition.

Messrs. Andrew make these engines from  $\frac{1}{2}$  to 400 H.P., and the "Stockport" has proved itself to be a most reliable engine of the latter power. The Grand Central Hotel Co., Limited, of Belfast, are having a 30 H.P. "Stockport" fitted for their improved electric plant. This hotel is the largest in Ireland, and it speaks well for this engine that they should have selected it out of so many shown in the exhibition.

Mr. F. A. Porter, Messrs. Andrew's Belfast agent, is showing in his stand a small 1 H.P. "Stockport," which has already been sold, and has many admirers. He also shows Messrs. Johnson's (Armley, Leeds) patent brick-making machine. It is a very powerful machine, and is capable of turning out from 15,000 to 20,000 bricks per day.

Messrs. J. Sagar & Co., Halifax, manufacturers of wood-working machines, are also represented on the stand, and the dexterity shown by Mr. Grigor in manipulating their patent band-saw is one of the features of the exhibition. The demand for Messrs. Sagar's machines is very great, and they have already sold an immense amount of wood-working machinery of all kinds to cabinet-makers, saw-mills, builders, &c., in Belfast, Dublin, Cork, and all over Ireland.

Messrs. John Cowley & Son are also to the front with their various screwing machines which are so well known in the engineering trade.

Messrs. Nelson & Co. show on this stand samples of their celebrated fibrous non-conducting composition, "Island" brand, of which they are the oldest manufacturers in Ireland. They have executed orders for most of the large engineering firms in the country in asbestos, fossil meal and other non-conducting compounds, and their references contain the names of nearly all the steam users in Ireland. They have just completed a very extensive contract for the Avoniel Distillery Co., Limited, whose order for covering was one of the largest placed in recent times. Last, but by no means least interesting, invention on the stand is Smith's patent reversible tramcar seat. The object is to turn the seat when rain comes on and then you will always have a dry seat. Simplicity of working is the most prominent feature about this very ingenious contrivance, and I think it will not be long before most of the tramway companies recognise its value. As will be seen from above, Mr. Porter is well to the front with the various inventions for which he is sole agent in Ireland. The Belfast office is 13, Queen's Square, and the Dublin one, 35, Parliament Street.

The next stand to catch the eye of the engineer is that of Messrs. Tangyes, Limited, Birmingham, who exhibit samples of their skill in the manufacture of gas, steam and oil engines, their name is so well-known that it is hardly necessary for me to give a lengthened description of their engines. They have working on their stand a 6 H.P. nominal gas engine (Pinkey's patent). The smooth way in which this clever piece of machinery runs is one of the features of the exhibition; in fact anyone passing and not looking in the direction of the engine would not be able to tell that the engine was working at all. Messrs. Tangyes have a very large sale for the engines and can now make them up to any size. When working in conjunction with the gas producing plant the fuel consumption is under 1 lb. per 1 H.P. per hour. They also show a '94 pattern Duplex boiler feeder  $4\frac{1}{2}$  in. by 3 in. by 5 in. This pump is specially designed for ship work, and great care has been taken to combine lightness and strength with low cost of production. These pumps are made for a steam pressure up to 200 lbs. per square inch. Alongside the gas engine they show their petroleum engine (Pinkey's patent). This engine is capable of giving 4 H.P. effective and is of remarkably simple construction. It has been carefully designed so that it can be with safety placed in the hands of servants, farm labourers and those unskilled in the handling of machinery. It has but two valves, the inlet and exhaust, and has no air or oil pumps, and is very simply started. The consumption of Royal Daylight oil is under 1 pint per I.H.P. per hour. They also exhibit a 8 in. by 9 in. vertical steam engine fitted with quick-speed governor of the Pickering type (made in England); chain and rope block are also shown. They have a 14 H.P. nominal



gas engine driving a Holmes' dynamo for electric lighting. This engine gives 31 H.P. effective and is a fine specimen of Messrs. Tangy's skill.

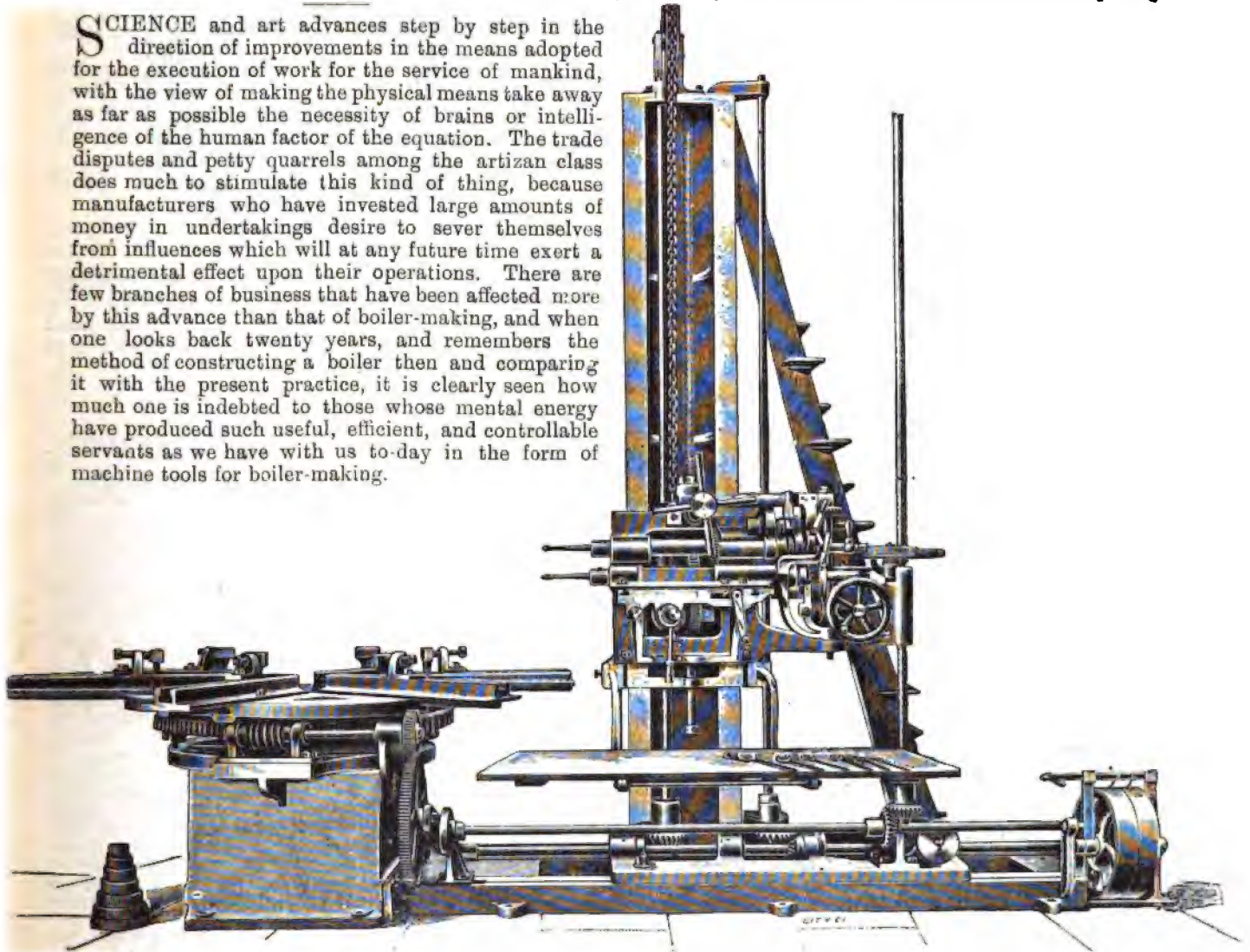
Messrs. Tangy's Belfast representative is Mr. Chester W. U. Adamson, 35, Royal Avenue, Belfast.

### BUTLER'S IMPROVED SPECIAL BOILER-DRILLING MACHINE.

SCIENCE and art advances step by step in the direction of improvements in the means adopted for the execution of work for the service of mankind, with the view of making the physical means take away as far as possible the necessity of brains or intelligence of the human factor of the equation. The trade disputes and petty quarrels among the artisan class does much to stimulate this kind of thing, because manufacturers who have invested large amounts of money in undertakings desire to sever themselves from influences which will at any future time exert a detrimental effect upon their operations. There are few branches of business that have been affected more by this advance than that of boiler-making, and when one looks back twenty years, and remembers the method of constructing a boiler then and comparing it with the present practice, it is clearly seen how much one is indebted to those whose mental energy have produced such useful, efficient, and controllable servants as we have with us to-day in the form of machine tools for boiler-making.

worked by a handle fitted with a quartering box and change wheels.

The vertical standard carries two drilling spindles, with hardened steel end thrusts, one of which is mounted on the drill carriage, and the other or lower one is arranged so that it can be placed either immediately under it for drilling the vertical seams, or in line with it for the ring seams, so that the two drills can always be at work at the same time. The spacing



We have pleasure in illustrating in the adjoining illustration, an improved special boiler-drilling machine. This is a large and powerful machine that has been specially designed for drilling and spacing a number of holes in boiler shells, flue tubes, &c. It will be noticed that large work is fixed by means of screw dogs fitted into radial arms, which are securely bolted in T slots to the table, while any work 6 ft. in diameter or under, may be fixed direct on the table, which is mounted on roller bearings, and has a central trunnion of large diameter. The circumferences of the work can be accurately divided by means of a large worm-wheel fixed under the table, and

of the holes in the vertical seams is accomplished by the screw inside the standard, which also has a quartering arrangement so that a variation of  $\frac{1}{4}$  of an inch can be spaced. Each drill-spindle is driven independently of the other, and can be instantaneously stopped or started. The weight of the drill-carriage is balanced so that it can easily be moved. A platform for the workmen to stand on is fixed to the drill-head and rises with it. Steps are fitted to the ridge of the standard, so that the workmen can get up and down without having to lower the drill-head. The standard is adjustable on the base by a rack and pinion to meet the difference in the diameter of the work. The

machine illustrated will drill holes 1 in. diameter at 9 ft. 6 in. high and 12 ft. diameter, and is manufactured by Messrs. J. Butler & Co., of Halifax.

### CONTROLLING MARINE ENGINES.

WE have received a pamphlet on the controlling of marine engines from Messrs. Durham, Churchill & Co., in which they deal with this important matter upon a basis that appears to us to be very tenable. The pamphlet commences with the statement that every prudent man naturally takes precautions against contingencies, more particularly against those which are highly probable and fraught with dangerous, uncomfortable and expensive consequences. On this ground every prudent marine engineer should see that his engine is provided with a thoroughly efficient and proper means of control, not only to reduce the risk of breakdown, but in order that the main engines shall give a higher mechanical efficiency. There are doubtless some engineers who are biassed against governors, but enquiry invariably shows that their experience has been gained either with machines incapable of fulfilling the duties of a governor, or with a good machine too small for its work or rendered useless by bad fitting. It is laid down in the pamphlet that to efficiently operate the controlling valves, it is absolutely necessary to have a most sensitive yet powerful governor, capable of coming into operation at every part of the revolution, so as to regulate the supply of steam according to the load on the engine. Ninety per cent. of the breakdowns of marine engines occur in fine weather, when the engines are being pressed to their utmost, and the engineers, not "standing by," are least prepared for a mishap. With reference to the means for governing, it is stated that the governors should operate the throttle valve on the smallest increase of speed, that the throttle valve shall be capable of absolutely cutting off the steam, and that in triple and quadruple engines the steam already in the cylinders and casings and the vacuum shall be also controlled. To carry out this triple object Messrs. Durham & Churchill have laid themselves out to supply a governor, throttle valve, and a compound attachment which jointly effects the results as above described, so that whatever happens, the engines are so under control that the risk of breakdown is reduced to the minimum.

### HYDRAULIC LEATHERS AND THEIR LUBRICATION.

WE have lately received a circular from Messrs. Fleming, Birkby & Goodall, Limited, of West Grove Mill, Halifax, giving particulars of their goods for hydraulic work, of which we illustrate one article in the adjoining diagram. This firm makes a speciality of hydraulic leathers, and claim as items of importance in this matter—1st, that they are themselves makers of these goods; 2nd, that they never use leathers that have been tanned with chemicals, as this is the principal cause of rough, corroded and fluted rams; and 3rd, that they use nothing but oak tanned leather. The circular in question gives some valuable hints to users of hydraulic leathers, which should prove of service to those concerned.

This firm have paid special attention to the lubrication of hydraulic machinery, and have acquired a sole license for Entwistle's Patent Hydraulic Ram and Cylinder Lubricant. It is generally known that the ordinary method of lubricating bearing surfaces, which are subjected to the action of water, affords no protection against corrosion; hence the rams and working surfaces become porous, rough and fluted, thereby causing the leathers to wear out very quickly, and creating a very serious item of expenditure and

annoyance, consequent on stoppage for re-turning or boring out of rams or cylinders, and replacement of leathers. By the use of the before-mentioned lubricant it is claimed the following advantages are secured:—1st, all corrosion is arrested and perfect



lubrication of the parts ensured; 2nd, the composition fills up the grooves and rough places caused by corrosion; 3rd, the making of the bearing faces smooth; and 4th, the reduction of corrosion and friction to a minimum.

### SIMON'S NON-CONDUCTING COVERINGS.

THE importance of a perfect non-conductor for use on board ship cannot be overrated. It will be generally conceded, we think, that such a covering must thoroughly imprison the air spaces, be durable, be capable of resisting all shocks, such as occur in deck use, be easily removable and replaced, be fire and acid proof, be light and practically everlasting, and under no circumstances must it break off or crumble into powder, and in this manner find its way into bearings. Further, it must be so manufactured that it can be put on or taken off by a boy, and made to any reasonable shape, and be capable of immediate application under any circumstances to boilers or pipes whether they be hot or cold.

A non-conducting covering has been invented and patented by Mr. S. Simon, of 2, Townfield Lane, Liscaud, Liverpool, for which the inventor claims all the advantages and characteristics detailed above. This covering consists of a foundation of woven cloth upon which are mounted close to one another a series of separate laminated blocks of material in such a way that when the covering is bent in either direction, the spaces between the separated blocks permit of flexure without difficulty, although the covering may be an inch or more in thickness. The attachment of the blocks to the cloth is effected by means of a network of cord which covers the blocks and is attached to the cloth in the spaces between the block, so that the blocks are kept in place on the cloth.

These coverings are usually made entirely of asbestos, but when desired they can be made of other material, and in any shapes or sizes required, the usual stock form being that of sheets and bands. The asbestos net which comes next the pipe or boiler is divided into small lozenges in which the air is confined in minute quantities, as well as also in the blocks. The air is thus prevented from setting up convection currents.

By reason of the laminated and cellular character of this covering less thickness than usual is sufficient to produce a given result, and hence, the first cost is less.

**Marine Engineers' Examination.**—At the Board of Trade Examination held at North Shields on April 9th, 10th and 11th, Mr. S. Downs, of Bradford, and Mr. A. A. Ward, of Derby, succeeded in obtaining their certificates as extra first-class engineers. They were prepared by Mr. W. H. Thorn, 5, Waterville Terrace, North Shields, making twenty-eight successful pupils in the above grade from this establishment.



## THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

## The "St. Paul."

IN a postscript to my Notes for April, I mentioned the unfortunate incident which attended the first attempt to launch the second of the pair of sisters which are about to be added to the American line. After a delay of nearly three weeks the attempt was renewed and completed without further mishap. The fault is said to lie with the quality of the grose used for easing the ways. But whatever the reason may be matters little. The fact remains that Messrs. Cramp were put to a great deal of inconvenience and expense through the occurrence, which is by no means unprecedented, even on this side of the Atlantic, and in yards which have had very great experience in turning out steamers of the largest class. The lesson seems to tend in the direction of proving that it is a very thin line which divides failure from success on these, as on many other occasions, and that therefore those shipbuilders who are able to construct their leviathans in dry docks save themselves a certain amount of risk for the extra expenditure they incur.

## The Hamburg-American Line

is one of the most enterprising and well managed of the fleets of the mail lines, and a short history of the enterprise which appears in Kuhlrow's "German Trade Review," is therefore of general interest. We see how the line, beginning in a most humble manner in 1847, entered the fierce competition of the Atlantic trade some nine years later, and, gradually building up its experience and strength, started its well known Express service some six years ago. The success of this service is too well known for me to need to say anything about it here. But the constitution of the fleet is a matter which calls for the attention of English engineers and shipbuilders. For very many years this company was a constant and valuable customer to the Clyde. When the Express service came on the tapis, the experiment was tried of having half the quartet of twin-screw greyhounds built in a native yard. Whilst, of the remaining two, one came from the Mersey and the other from the Clyde. The Mersey-built *Columbia* is certainly a much faster vessel than the Vulcan Co.'s *Augusta Victoria*, though she was not as the "Review" states, "for some time the fastest afloat in the Transatlantic service," for her speed is not equal to that of the older vessels *Umbria* and *Etruria*. But with the experience gained in the *Augusta Victoria*, the Vulcan Co. were able to make a very fast vessel in the *Furst Bismarck*, which has hitherto done better than the Clyde-built *Normannia*. It looks therefore as though the Germans had now learnt all they can from us, and are quite able to build the highest class of merchant-man for themselves. The French too were once good customers to the Clyde, but in the recent production, *La Touraine*, we see that they can turn out as good ships as the Germans, and now the Americans are about to show us what they can do in the competition. It is urged that we can build cheaper than anyone else, and that is at present certainly true. The Germans press us most closely in that regard. But the legislation of these countries is carefully designed to prevent us getting the benefit of our power of building cheaply when we are in rivalry with native yards, and it becomes apparent that we are unlikely in the future to get the useful foreign orders which did so much for our yards in the past.

## The Twin Screw

has got another valuable convert in the Warren Line. This important concern has long run a service of first-class cargo steamers to Boston. The vessels have hitherto, however, been of the single-screw type. But the importance of duplication of machinery for vessels carrying valuable cargoes, especially cattle, has become so apparent, that the *Scotsman* (as the new boat is called) has been fitted with two sets of triple-expansion engines. She is the production of the Queen's Island yard, and is of 6,000 tons gross measurement.

Meanwhile, the West India Royal Mail Line has had another strong hint that it would be wiser if they were to do likewise. Their s.s. *Clyde*, homeward bound from the Brazils with mails, passengers and treasure, was detained for 27 hours through an accident to the piston rod of her high-pressure engine. The derangement occurred in the Bay of Biscay, and in a strong gale, according to the telegrams published in the *Times*, a journal which does not often lay itself open to a charge of sensationalism. Fortunately, the gale was blowing off shore, and

so there was no risk. But it might appear that if it be worth while to fit the twin-screw to cattle-boats for the sake of ensuring regularity in length of passage, a similar precaution would not be thrown away in steamers that carry the mails.

## The Beaver Line.

Last year I wrote an obituary notice of the Beaver Line. I am glad to have to admit that I was premature in doing so. The case was not anything worse than one of suspended animation. The line is resuscitated, and is to recommence its sailings from Liverpool on the 4th of May. The old fleet is still at its service, and it has new Liverpool agents, a firm of no less standing than Messrs. D. & O. Molver, who were connected with the Cunard Line before the premier Atlantic Co. became a limited concern. There is every indication that the year 1895 will be a better season for emigration than its predecessor; indeed, it could hardly be worse; but rates are hardening, and we may hope that there will be work enough for all the competitors in the field.

## The "Wairapara" Disaster

has now been reported upon by a Court of Inquiry. Severe, but not unmerited, condemnation has been meted out to certain of the surviving officers. Some of the dead were not guiltless, and their faults were referred to lightly.

Two classes of persons, however, as well as one or two of the deck officers, showed that they were not forgetful of the traditions of the British Mercantile Marine. Giving the place to the ladies we must notice the heroism of the stewardesses who, when it became a case of "each for himself," gave up their lifebelts to female passengers, and then were lost in an unaided attempt to carry the children into safety, whilst the men were taking themselves to the rigging. This is heroism of an active and noble kind. But it is worthily bracketed with the steadiness of the engineers. It appears that the vessel remained upright for eleven minutes after the shock of striking. Then she turned over, so that the unlaunched boats were obviously useless. At this juncture the fore-rigging seemed the safest place on the ship, and thither some of the officers felt justified in seeking safety for themselves. Things must therefore have been very bad indeed, and yet for another eighteen minutes the engineers stuck to their duty, and kept the engines going. What their doing so meant to their shipmates is well expressed by a quotation from the evidence of one of the surviving officers, Mr. Moys, who admitted that he said to the captain, "For goodness' sake keep her going ahead, or she will slip off the ledge and we shall all be drowned." The engineers did keep her going ahead, as I have indicated, and their conduct met with great commendation from the Court of Inquiry for the way in which they behaved, the chief engineer and Mr. Dunlop particularly so, the President remarking that "had all orders been given and carried out with the same promptitude my task would have been a much less painful one." What the feelings of these gentlemen, doing their duty below the water-line, in momentary expectation of being drowned without even a struggle for life, must have been during those long eighteen minutes can be better imagined than described. But their bravery will not be forgotten, and it is an honour to the profession of marine engineering, which indeed is accustomed to hearing of noble deeds wrought by its members.

Apart from the matters I have mentioned, the loss of the *Wairapara* is noticeable for the captain's unaccountable error as to his position, and for the mismanagement of the boats. The former matter needs little comment. We all are prone to make mistakes, and he expiated his by dying at his post on the bridge. But the boat question is one that needs attention. Here the boats had not been moved from their chocks for at least six months previous to the disaster. The gear was stiff, and the men ignorant of their stations and of their duties. Had things been otherwise, the loss of life on the occasion would have been much less. If new rules for boat drill be made and enforced by those shipowners who have hitherto neglected the point, we shall feel that something has been done to prevent a repetition of this great sacrifice of human life.

## The Dominion Line.

As most of our readers are aware, the Dominion Line was bought *en bloc* by a Liverpool shipping firm, and is continuing its sailings without interruption and with increased energy. I was therefore a little astonished to read in a weekly shipping paper, under the head of "American Shipping News," the

following paragraph, dated New York, 6th April, 1895:—"S. Lawrence navigators are looking for many changes in the ships and companies of the Montreal and Quebec trade in the coming summer. The Dominion Line having gone out of existence, the old ships, *Sarnia*, *Dominion*, *Toronto* and *Ontario* having been sent to Belfast to be broken up, and a new service out of London and Bristol promised, it is anticipated that other changes may also occur." I may say at once that other and very startling changes might well be anticipated to occur if the facts—or any of them—were as this American correspondent states. First, as we all are aware, the Dominion Line has not gone out of existence. Its agents and interest have changed, and that is all. Its advertisements are still to be seen as heretofore in the daily shipping press. Next let us examine the breaking-up statement. This is, on the face of it, extraordinary, when we remember that the oldest vessel there mentioned is the *Dominion*, built as recently as 1873, and thus of an age which is by no means patriarchal in the St. Lawrence, and moreover a vessel which only a very few years ago had new boilers and her engines tripled. This vessel has in truth been to Belfast, but only for an overhaul. She arrived there on the 19th January, and returned thence on the 11th April, and left Avonmouth for Portland, Maine, on the 19th. The *Ontario* is a vessel of nearly the same age, but the other two vessels were built in the early eighties, and are comfortable and useful ships; they are not likely yet awhile to go to the scrap heap. The new owners have naturally had their latest acquisitions overhauled, but the service from Bristol, at all events, will probably for some time to come be carried on by these very prematurely condemned vessels.

#### The White Star Line

is to have its New York service reinforced by the return of the *Germanic* in May. She is advertised to take the sailing of the 15th of the month. Her performance will be watched with the greatest interest, for she and her sister, the *Britannic*, were the first modern steamers to astonish observers by the fact that their speed regularly and consistently improved with age. It is believed that her new engines are to be of greater power than those with which she was originally fitted, and it will be very interesting to see if her speed will in future be greater than it was originally. I do not remember a case where a vessel on being re-engined, improved on her former performance. Take, for example, the *City of Berlin*, a vessel which was the contemporary of the *Germanic's*, and one which for a time held the record against her. In 1875 and the beginning of 1876 these two vessels were cutting down the eastward record against one another, the *Britannic* at the moment being out of the competition. The *Germanic's* 7 days 22 hours was met by the *Berlin's* 7 days 15 hours and a-half. Then the *Germanic* got it back with a run 12 minutes better. I do not think the *Berlin* ever with her old engines bettered that 7 days 15 hours and a-half. In 1891 the *Germanic* had got her time down to 7 days 7 hours and a-half with her original engines and boilers. Her horse power was given at something near 5,000 I.H.P. Turning to the *Berlin* again, we find that her I.H.P. on trial when new was a couple of hundred greater than that of the White Star boat. When she had her engines tripled it was increased by over 800 I.H.P. on trial. Yet in my Notes I can only find two eastward passages of hers in the two years immediately following her refit which were under eight days between Sandy Hook and Queenstown. One of these was just over 7 days 12 hours, which was certainly better than her best previous performance, but the other was some ten hours longer. Her average for the years 1875 and 1890 are almost identical. We know nothing, of course, of the conditions under which she was worked at various periods of her history, but the broad fact remains that this vessel indicated 800 H.P. more on her second trial than on her first, and did not show any corresponding increase in her sea speed.

Those who are interested in historic mail steamers will soon have an opportunity of seeing the pioneer of the White Star Line, for the *Oceanic*, after fifteen years on the Pacific is homeward bound, and by the time these Notes are printed, should be in home waters.

The *Teutonic* seems destined to be officered by those who are strong swimmers as well as brave and determined men. The feat of Captain McKinstrey, then her first officer, who jumped off the bridge of the big ship at the 1889 review at Spithead to rescue a drowning man, made some sensation at time. Captain McKinstrey has long had a command of his own, but

the present third officer is following his good example. The *Teutonic*, homeward bound, was going up the Irish Channel on the morning of the 17th of April, when a Spaniard deliberately jumped overboard. He was quickly followed by Mr. Johnson, the third officer, and a trifle later by one of the ship's lifeboats. When the latter came up to the two men it was found that the suicide was violently resisting the attempt to save him. He was, however, got into the boat. When the boat was picked up by the *Teutonic* he was found to be dead. This does not lessen the bravery of Mr. Johnson's feat. It is well that he was recovered safe and sound, and that a valuable life was not thrown away as was the sad case a few weeks ago on board the P. & O. steamer *Kaiser-i-Hind*. There a drunken Malay fell overboard, and Mr. A. J. Cooper, the third officer—who had previously received several awards for life-saving—plunged after him. A boat was at once lowered, but the tackles fouled and several men were precipitated into the sea. When at last the boat was despatched all traces of the two men had disappeared, and a brave man's life was lost.

#### The Ocean Graveyard.

A correspondent has written to express his interest in the subject treated under this head a month or two ago. He asks whether it would be possible to give a complete list of the steamers "posted as missing" on the North Atlantic. He also asks if there was any such loss before that of the *President*. Answering his last query first, because it is the easier, I think there is no doubt that the *President* was the first on the long and melancholy list. Then going to the other part of his letter I would observe that the length of the list is such as to preclude me from printing it, even if I could make it out. Of mail steamers posted as missing, the list is not very long, though it is quite large enough. But since the ocean has become covered with tramps, the number of steamers of all classes which have disappeared and left no trace is legion. I think I am not exaggerating when I say that every winter at least half a dozen are lost on the North Atlantic, and that not reckoning the considerable number which are accounted for by the terrors of the Bay of Biscay. These losses, however, attract comparatively little attention. There may be a short paragraph in the papers that such and such a steamer is seriously overdue, and later on, another brief announcement that she is quite given up may follow. But that is all. There are no harrowing details to sell the sensational halfpenny papers, and the occurrence is soon forgotten, save by the relatives of the crew. And their grief, as suspense is slowly forced into certainty that their loved ones are gone, is often likely to be of a very heartrending kind. Formerly, as there was no survivor to give evidence, the Board of Trade did not often hold inquiries into these losses, but of late years they have generally gone into the questions of the manning, construction, outfit and loading of the vessels, and generally taken what outside evidence might be available for the purpose of finding out as nearly as might be what was likely to have been the cause of the disaster. Thus of the losses which have occurred of recent years it is comparatively easy to find traces and to give details and dates. But of many of the early disappearances the bare fact seems alone traceable. For example, there was the case of the *Tempest*, which was one of the pioneer vessels of a line which has since become famous in almost every trade. She was, I believe, posted as missing in 1857 or thereabouts. But I know nothing beyond the bare fact. If some reader who remembers the circumstance would kindly let me have a note of the case, it might prove to be a matter of general interest. The same remark would apply to information regarding any other important losses of early days.

#### The Baltic Canal

has a very important military character which does not concern us who are here interested chiefly in the mail lines. But it is also sure to have an important bearing upon the mercantile fleets of the world. The opening of the Suez Canal made a revolution in the Eastern trade, for sailing ships are practically debarred from using artificial waterways. They had therefore to retain the old Cape route whilst thousands of miles were cut off the steamer's journey to the East because of the possibility of its using the Canal. The steamer was thus enabled to compete at an unusual advantage with the sailer, and the latter in those trades lost its hold upon all cargoes except such as sugar, for which shippers and consignees, for market reasons, seem to prefer to have afloat for six months.

The sailing ship will have another blow here for it will be greatly handicapped in the trade to and from the Baltic. A table has been prepared which shows that from almost every port the voyage to the Baltic will be appreciably shortened by the opening of the new waterway. I say almost every port because from the Scotch, Norwegian and East Coast of England ports the saving of time would be so trifling as not to make it worth while to pay dues, and vessels from these ports will not be likely to avail themselves of the facilities offered. The greatest saving will be to steamers bound from Hamburg. They are to save 425 miles, which is reckoned as equivalent to a reduction of 45 hours on the passage. Vessels from the Dutch ports and Antwerp and London will save about a day. In reckoning to what extent the facilities will be used by merchant ships it is of course necessary to consider the usual question—"Will it pay?" The answer depends in the first place on the view the underwriters take. Will they consider the dangers of the canal less than those of the sea passage and accept a reduction in premiums? This remains to be seen. When the answer to this question is settled and put on one side of the account we must, in the case of London vessels, consider if one day's interest and depreciation on the capital embarked in the ship, with one day's wages, coal and provisions, will amount to a sufficient value to pay the dues demanded for the privilege of using the canal. If there is a sufficient balance in economy in favour of the new route to overcome the conservatism of the shipowner—who hates to alter his time-honoured customs—we shall see the canal much used and another weight added to the burden to be carried by the sailer in the race for existence.

#### Captains.

Talking of sailing ships reminds me that the death is announced of one of the most famous captains of the old racing clippers. Captain McKay, who commanded some of the fastest sailing vessels which raced the early steamers between England and the Antipodes. He was the brother of the great Boston shipbuilder.

A well-known Cunard captain has also joined the majority. This was Captain E. F. Fenwick. He was for thirty-five years in the service of the company though he did not get a command till 1885. I think his first ship was the *Morocco* and he afterwards had the *Kedar* and other Mediterranean liners.

#### Robberies at Sea.

The difficulties of maintaining order amongst passengers on the big liners has often been noticed, and as the number of saloon passengers carried in single ships increases, the problem seems to get harder. The well-dressed rough is always the most difficult to deal with, and I have on previous occasions spoken of the gambling question. The line which divides the professional gambler, or "bunco-steerer," to use the American equivalent, from the ordinary thief, is a very fine one. Thieves at sea are very hard to cope with. Space, even in the biggest vessels, is after all very limited. Room-mates are soon on very intimate terms, and friendships ripen very rapidly, and enquiries as to pleasant people's antecedents are not insisted upon. Thus it becomes easy, where state-rooms are left open, for the dishonest to take advantage of confidence, people thinking that the difficulty of getting plunder away would prevent thieves risking detection. It appears, however, that the prosperity of the Cape has made some clever criminal chose a Cape liner as a hunting-ground. From one passenger's trunk he extracted diamonds, from another he stole valuable papers. The incident occurred before Madeira was reached, and the detective talent of the officers being exhausted, they telegraphed home from that port of call, with the result that a detective awaited the ship's arrival at Plymouth, and attempted to solve the mystery. He was, however, also unsuccessful, and we fear the thief has got clear off with his booty. There seems to have been no effort or expense spared by the owners to protect their passengers' property, but it is obvious that no precautions by the authorities can save passengers from being robbed if robbers chose to direct their energies to this promising field and passengers do not protect themselves. All valuables should be handed to the purser for carriage in the ship's safe, and a receipt taken from him. It may be that persons think their property would be safer in their own possession in case of accident to the ship. Apart from the improbability of accident to a well-found liner, we may remember that that risk can be covered by insurance, and that the passenger agents will usually insure the baggage what time the passage is taken.

#### The Boston Trade

has had a severe blow in the accident which landed one of its regular liners on a bank in the channel. The vessel is now a total loss, and her fate is a strong commentary on the wisdom of the policy of the New York people in their struggle with the out-ports. Last month I referred to the way in which they are "besting" Philadelphia. Now it appears that they are likely to get something from the deficiencies of Boston. How are the mighty fallen! Most of my readers remember reading how in the early days of the Cunard Line, the Boston merchants clubbed together to cut a canal through the ice to insure the regularity of the mail service from their port to Liverpool. Now they are not asked to combat the occasional ice, but merely to keep their harbour clear for their regular traffic, and they are too apathetic to do their duty. Yet piping times may be expected in Boston Harbour if the competition promised be followed up with any warmth.

Cunard's talk of starting an extra service—according to the *Shipping Gazette*—to be inaugurated by their new steamer the *Sylvania* on the 27th April. There will then be two Cunarders, two Warren, and one Leyland liner sailing between Liverpool and Boston, and it is very difficult to see how any of these lines can hope to secure anything but serious losses from such a struggle for the trade which has hitherto been efficiently carried on by a service not much over half as frequent as that now threatened and maintained by much smaller vessels than those recently added to these fleets.

#### Liverpool Improvements.

The alterations in the departure of the Cunard mails, which I spoke of as imminent in last month's notes, are now accomplished facts, and have shown the experience of several weeks' work. The change has been rendered possible by the universal adoption in business houses of a Saturday half-holiday. All work is now done in the forenoon of that day, and it was felt that if the American mails closed in London generally at 1 p.m. on Saturdays, with a little margin at the General Post Office for letters with a late fee, a considerable saving in time might be effected without inconveniencing anyone. Accordingly the mail is now despatched from Euston at 4.10 on Saturday afternoon, some four hours and twenty minutes earlier than heretofore, and running at its usual speed throughout, this enables the Cunarder to get away between 8 and 9 on the Sunday morning instead of between noon, and 1 p.m. Not only will this in summer insure the landing of Cunard passengers by the *Campania* and *Lucania* on the Friday afternoon, but it will cut down the patience-trying wait at Queenstown in all cases.

Meanwhile, Southampton has tried the experiment of bringing the German steamer up to the docks for the purpose of landing and embarking passengers, and has found that the extra delay to continental travellers thereby occasioned, is very trifling compared with the advantages given to the London-bound passengers.

#### The Union Line

has given a good deal of information regarding its present fine fleet in its magazine, the *Union Line Gazette*. Now it is beginning to deal with its early boats. I have received a copy of the April issue, wherein are several views of the patriarchs of the line with details as to their dimensions and performances which cannot fail to be of general interest. The illustrations, which are of considerable interest, are from the collection of Mr. Herbert Summers, of Clifton Down, Bristol, a gentleman from whom I have myself obtained valuable information for this column on more than one occasion.

#### The Oroya.

Another success to the German Salvage Co. The *Oroya* was moved a 100 ft. seaward on the 19th April, and on the 23rd she was towed into safety in Naples Harbour.

**Water-Tube Boilers and the Debate in the House.**—During the debate on the Belleville boilers in the House of Commons, on April 29th, models of the Yarrow patent water-tube boiler were exhibited and explained to the members; and, as there are no less than 80 boilers of this type being constructed at the present time for vessels in H.M. Navy, Messrs. Yarrow's exhibit was of considerable interest. The room in which the models were shown was the one in which Oliver Cromwell signed the death warrant of Charles the First.

### BAIN & AINSLEY'S "HA-HY" COURSE CORRECTOR.

**A**N improved form of the Bain & Ainsley's Course-Corrector is being put upon the market under the trade mark of "Ha-Hy," and for which a new patent has been obtained. We illustrate this instrument in the two adjoining diagrams, Fig. 1 being a perspective view of the complete instrument and Fig. 2 being a plan of the dial. It will be seen from the illustrations that the dial of the instrument is

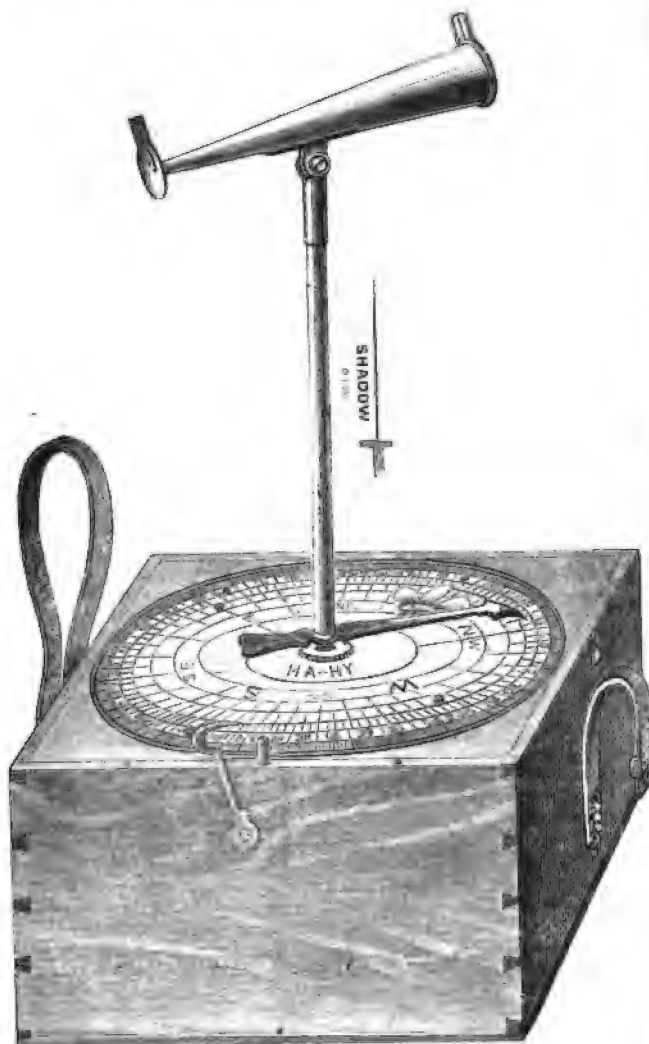


FIG. 1.

furnished with inner variation degrees on the circle, which are shown more clearly in Fig. 2; this will enable the variation to be set off more accurately than heretofore. Another novel feature of the instrument is the mounting upon the central standard of a conical sight tube and vane, with a dark glass shutter at the eye-end. The advantages of this conical tube and its shutter will be obvious to all those who have used the now obsolete instrument. It was heretofore very difficult to get an object within the framing of the

sight-vane, and without a dark glass head difficult to define this object if it was at all bright; both these difficulties have been overcome by the adoption of the conical tube and its glass shutter. The method of using this instrument with Burdwood's Azimuth Tables is to read A.M. bearings from south to north round by the west point, and P.M. bearings from south to north round by the east point.

In a north latitude, to set the variation you turn the south point of the inner dial the required number of degrees from  $0^{\circ}$ , while in a south latitude you reverse the compass dial and turn the north point as above.

In order to find the true course the ship is steering the shadow pin or style is placed in the centre of the compass dial, and the latter is turned till the north point is on the  $180^{\circ}$ , in which position it is clamped with the set screws; the sun's true bearing is found by Burdwood's tables; you turn the dials round the number of degrees required, and place the bearing on the ship's head. The shadow of the style will then fall on the true course the ship is making.

To find the magnetic course the north point of the



FIG. 2.

compass dial is set for variation and the sun's true bearing is placed on the ship's head; then the shadow of the style will fall on the magnetic course the ship is making. To find the ship's course by the north star, or by two lights, or by any other object, the shadow pin is removed and the sight vane is placed in the centre of the dial; the bearing of the object is then set on the ship's head. The bearing through the sight vane will be the true or magnetic course the ship is on, according as the bearing is true or magnetic that is placed on the ship's head. To find the course when the sun is rising or setting you place the amplitude on the ship's head and the bearing of the sun will be the course the ship is making. In all cases where the sun is dull and will not give a shadow, the sight vane is placed in the centre of the dial with the pointer reversed, the bearing of the sun is then taken through the sights when the pointer will give the course the ship is making.

This instrument is manufactured by Messrs. Heath & Co., of Crayford and London.

## A NEW WOOD-PRESERVING PROCESS.

**A**LTHOUGH the tendency of the last generation has been to substitute iron and steel in the construction of the hulls of vessels, there are still many details in shipbuilding for which timber is still the most convenient material, such as for boats, internal fittings, decks, masts, and other items too numerous to mention. A desideratum for the material, to be exceptionally suited for these various applications, is that it shall be absolutely protected from decay or rot, from the harbouring of insects or germs of any kind, and that at the same time it shall be of handsome appearance, easy to work with tools, and without offensive smell.

Hitherto the usual mode of naturally seasoning timber has been the extraction of the sap by time, for which even some years are necessary to effect an absolutely reliable seasoning, and the effect upon the wood is deterioration of quality by reason of sun, shakes, cracks, or by warping, twisting, shrinking, and other similar evils, and a porous condition is produced, rendering further absorption of moisture easy.

This may readily be understood when it is remembered that the structure of all hard or exogenous timber is that of a number of vertical tubes bound together by transverse medullary rays. The desiccation of these tubes, which, when the tree is in life are filled with sap, causes a shrinkage of the general structure, and leaves the tubes empty and ready for the further absorption of moisture, so that at every atmospheric change it alternately swells and shrinks.

Other methods are also in use, all based upon the same principle, viz., the extraction of the sap and its substitution by foreign matter, such as corrosive sublimate, chloride of zinc, sulphate of copper, pure creosote, or other similar chemical substances.

Of these processes probably only that of injecting creosote has been largely used, and this has been found to be open to many objections, the difficulty, if not impossibility, of impregnating the wood with the oil to any great depth, leaving the centre still liable to decay. The wood so preserved has a most objectionable odour, which would prevent its use for internal woodwork, or anywhere where the odour would be offensive; further, it cannot when so impregnated be readily worked by tools.

The Haskin process, known as Haskinizing or vulcanizing, is a new departure both in theory and practice, and is based upon the principle of treating the sap *in situ* within the pores of the wood, so that the whole of its preservative properties are retained, and solidified within the structure itself. The sap of wood contains certain albuminous, glutinous, resinous and oleaginous substances in a state of solution, and it is these compounds that nature utilizes to gradually create the hard, sound fibrous portion of the wood.

Colonel Haskin, the inventor, follows the course of nature but improves thereon, by concentrating into a process of a few hours that which nature takes years to effect. The soluble sap becomes insoluble in the substances of the fibres, thus filling up the tube or pores, forming a homogeneous mass incapable of absorbing moisture, impervious to atmospheric changes, unshrinkable, easily worked without smell, and of a splendid appearance when worked up with tools. The vulcanizing appears also to carry out rapidly the natural ripening of nature, thus merely deepening the natural tints, and producing a most harmonious and marked result on the texture of the wood when worked.

Colonel Haskin's process is carried out in a cylinder made of boiler-plate, sufficiently strong to withstand an internal pressure of super-heated circulating compressed air of several atmospheres, for the purpose of holding the fluids of the wood from evaporation. The wood is piled on cars, which are run into the cylinder, and the air is pumped from a large compressor into the cylinder, after it has passed through a small stove or furnace, so as to become super-heated.

The air-pressure holds the sap or fluids in the wood, effectually preventing their evaporation, while the intense heat passing through and clear to the centre of the timber, so sublimates and attenuates the fluid matter of the wood, that a new compound is formed, or rather, the constituent elements of the sap are thus caused to enter in combination with one another, which otherwise are, under lower degrees of heat, distilled or desiccated separately.

All preconceived methods of curing and preserving lumber are here reversed, and instead of distilling out these valuable antiseptics, they are distilled within the wood itself, and are

affiliated as a new and oleaginous compound, which oxidises on contact with the air, and the timber is rendered sound and homogeneous without possibility of decay or shrinkage, after a process of a few hours.

A large number of specimens of vulcanised wood are on view at 2, Dean's Yard, Westminster, S.W., and those interested in wood seasoning are invited to call and inspect them.

## NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondent.)

### Navy Notes.

**T**HE boiler question has commanded, if anything, increased attention during the last month. There was a very excellent defence of water-tube boilers in the *Times* of the 9th April over the signature of Mr. John Sampson. If he did not add very much to the sum of our knowledge about the powers of the new steam generator he certainly strongly exposed the ignorance of fact and the recklessness of statement of the opponents of the view he takes. On the other hand he points out that, though the French have undoubtedly had trouble with the *Brennus*, it has not been with her boilers, which have quite fulfilled their promise. Then he proceeds to go categorically through "M.'s" attack, and to correct and answer his statements. He refers to the experience of the Messageries Maritimes with this type of boiler, and also to that of the Russian Admiralty. Like their French naval colleagues, the American mercantile engineers attribute their dissatisfaction in the case of the s.s. *North West*, not to the vessel's boilers, but to her engines. He closes by asking that those who criticise the action of responsible but pen-tied (if I may coin a word) officials would at least have the decency to give some clue to their identity. This as a guarantee of good faith, and to give the public some reason for listening to them, and some idea of the standing and information of the Admiralty's accusers. There is only one point in this letter which seems to have been missed. That is, that no criticism has been made of the assertion that whilst the *Seaford* burns 27½ tons in her cylindrical marine boilers per trip, her sister *La Tamise* requires 10 tons more for the same speed. Shipowners are proverbially reticent about the coal consumption of their vessels. Yet it would be well if the owners of *La Tamise* would afford the public some information on the point. It seems very hard to accept the statement as it stands, in the light of the knowledge we have of the consumption of the British torpedo-boat destroyers on their speed trials. The figures here given must be quite unimpeachable, and they would tend to show that the water-tube boiler is quite as economical as its older rival. It is true that the trials we have had hitherto the opportunity of criticising have been those of vessels fitted with Yarrow or Thornycroft boilers; but the thing attacked so virulently is the water-tube principle, not the application as made by various patentees, and we certainly gather that some patents are by no means extravagant.

A very unfortunate circumstance, in view of the open hostility shown to innovation in this department, was the explosion at a Clyde shipbuilding yard, when testing a water-tube boiler. The accident, on examination, it is true, proves to have been due to the blowing out of a temporary plug placed in position for experimental purposes; but the outside public does not know this, and we may be sure that the incident will be used for the purpose of discrediting the new method, although the accident had obviously no bearing on the controversy.

### The Challenger Expedition

has been concluded nearly twenty years, and yet it is only now that the report of what it accomplished has reached its completion. The report, in fifty volumes, is a national monument of more value than those of stone or brass. The last two volumes are from the pen of Dr. Murray, one of the naturalists to the expedition. He gives an interesting *resumé* of all the work done for the science of oceanography previous to the *Challenger's* labours, and then gives a scientific summary of the results of that memorable voyage. The briefest possible summary of all that was done during these laborious three years and a half is all that I can allow myself. The vessel carried six civilians of recognised position in the world of science, as well as a staff of able naval



officers. In that period the vessel was stopped 505 times for deep sea soundings. On these occasions the temperature of the ocean depths, the nature of the bottom, the salinity of the water, the nature of the under-currents and their direction were made, and, in addition, the tow was almost constantly out collecting what it could at intermediate depths. What use has been made of these materials is proved by the statement that no less than 76 authors have been engaged upon the production of the complete series of volumes, and by the fact that it has taken no less time than the period I have indicated to complete the working out of the results. Dr. Murray's deductions from what he has observed of the mud line are interesting and valuable. In our Reviews the MARINE ENGINEER has recently noticed a French work, which shows cartographically the distribution of the ocean mud, and I need not, therefore, refer to it again. But Dr. Murray considers ocean life, if not all life, originated in ocean mud. It is certainly most curious that this should be his conclusion. We know the old Greek story of Venus rising from the sea foam. We consider it but a fable. And yet here is the result of a great scientific expedition, conducted at the end of the nineteenth century, confirming as it were the poetry of the old world. It is unfortunate that the necessity of the case limited the issue to one hundred copies, so that very few, even public libraries, will be able to have copies of this invaluable contribution to the sum of human knowledge.

#### The Screw Propeller.

It is interesting to learn from a paper read at the Institute of Civil Engineers on the 2nd April, by no less authorities than Messrs. S. W. Barnaby and Thorneycroft, that in their opinion the present speed attained by the screw propeller has in the fastest craft now afloat approached the limit of efficiency. It will soon be a question, therefore, if this view be correct, not as to the comparative merits of twin and triple screws, but as to the screw in comparison with other methods of propulsion. Here is a vast field for experiment and research. We know neither the paddle wheel nor any modification, therefore, will help us, even if it were more efficient at high speeds, because of its vulnerability. We must have some mode of applying the power below the water-line.

#### The Work at No. 14 Graving Dock

at Portsmouth is being pushed forward by continuously working in order that it may be ready by the end of June, 1895. Thus it is hoped that ere the two great first-class cruisers now building in private yards are handed over by the contractors, there may be Government docks capable of accommodating them, and if only by a few weeks' margin, the Admiralty may be saved the reproach of having to dock its new requisitions in mercantile dry docks.

Dredging operations are being taken earnestly in hand at last, and the torpedo school-ship *Vernon* has been moved to a new anchorage in Porchester creek. With her goes her companion, the *Ariadne*, and not only will the school be in a somewhat remote spot, but it is said that to save a trifle of a few hundred pounds the two vessels are to be moored side by side. If this statement be correct it is to be hoped that some Parliamentary notice will be taken of the fact. It is obviously inconvenient to use ships so lashed. It is also certain that ventilation and light will be sacrificed, and it is not improbable that the health of those on board the vessels will suffer. We have not so many officers and men in the Navy that we can afford to sacrifice them needlessly, and we have no right to go out of our way to put them under conditions which cannot fail to impair both their health and their usefulness to their country.

The same reason which causes the removal of the torpedo-school demands the removal of the magazine hulks, *Grampus* and *Melampus*, which are to go to Fareham Creek.

The authorities at Portsmouth are busy getting the new torpedo-boat destroyer *Ardent* completed for commission, as she is to go to Malta to strengthen our defences at that port.

#### Pembroke Dockyard

is to have some money spent upon it to enable it to compete in speed and in economy of production with the more favoured yards. The *Renown*, a battleship of the type so much desired by Lord Brassey and those who with him wish for more moderate dimensions in battleships, is now making rapid progress.

The coast defence vessel, *Rupert*, which has long been guard-ship here, is to replace the *Bramble* at Gibraltar, and the *Thunderer* is to take up the *Rupert's* duties at Pembroke. The sub-

stitution of the *Rupert*, old as she is, is certainly a good move. For the *Bramble* is open to the same objections as the *Alert*, which I am about to criticise adversely, and has the further disadvantage of being some nine years older. She was far too trifling a craft to have ever been given the responsible position she has hitherto occupied.

#### Sheerness

has completed for her trials the new steam sloop *Alert*, of 960 tons, and 1,400 H.P. Her maximum speed is to be 18½ knots under forced draught, and she will be one of six useless vessels which are being added to the Navy. What is the good of spending the nation's money in vessels which have no speed and cannot do anything in time of war?

Dredging is to be undertaken immediately to enable warships to get up to Chatham in all states of the tide.

One of the new third-class cruisers to be constructed under this year's instalment of the Spencer programme is to be laid down on the slip on which the *Charybdis* was built.

Comparing this No. 1 third-class cruiser with the class of four built under the Naval Defence Act it would appear that the proportion of length and beam is to be very greatly altered. The new vessel is to be 300 ft. long, against 265 ft. in the *Philomel*, and 36·6 beam (that is 4 ft. 6 in. less than her predecessor), whilst her displacement (2,100 tons) will be 475 tons less. This alteration in form is to give her 20 knots with 7,000 I.H.P. at forced draught, as against 19 knots with 7,500 H.P. in the older vessel. The armament will be the same in point of number of guns carried, but the main armament will consist of 4 in. quick-firing guns, instead of 4·7 breech-loading guns.

The *Empress of India*, which was built at Pembroke and was originally known, like at least two other recent battleships, as the *Renown*, has, it is stated, showed signs of faulty construction during her recent cruise with the Channel Squadron, especially in weakness of her longitudinal frames, and she is to be overhauled at Devonport. So is the *Bellona*, whose boilers are in an unsatisfactory condition. The vessels of the Squadron are all to go to their ports and to have their annual overhaul previous to the Naval Manœuvres.

#### New First-class Cruisers.

A Parliamentary Paper was issued on the 23rd April containing particulars of the new first-class cruisers promised in the current Estimates. It will be remembered that their plans were not completed when the Estimates were presented. They must not be expected to rank with the *Powerful* and *Terrible*, for these vessels are apparently exceptional ships, built as replies to certain foreign-built cruisers of large tonnage and unusual power.

They will, however, be nearly half as big again as the first-class cruisers of the Naval Defence Act, such as the *Edgar*, whose high freeboard they are to have, and a couple of thousand tons greater than the *Blake* and her sister. They will not, however, have the forced draught speed which these vessels have on paper, though at natural draught they are to have half a knot more. The defensive arrangements to the ship's vitals will be on the plan adopted in the *Powerful* and *Terrible*. Indeed, they may be considered as smaller *Powerfuls*. The hulls are to be wood sheathed and coppered. Nothing is said as to the type of boiler to be given, this probably being left till after the debate on the subject of Navy boilers in the House of Commons. The bunker capacity is given at 2,000 tons; but, as we are told that only half that amount can be carried at the designed draught and displacement, it would be fairer to call it only 1,000 tons. A continuous sea speed of 19 knots is promised with clean bottoms and smooth water, which is not a very great concession to the demand for speed, considering the numerous merchant ships that attain that sea-speed in practice without any conditions beyond "average condition of ship and sea." The length, 435 ft., is 65 ft. less than that of the *Powerful*, 60 ft. more than that of the *Blake*, and 75 ft. more than that of the *Edgar*. The beam is 2 ft. less than of the *Powerful*, being 69 ft., against 65 ft. in the *Blake* and 60 ft. in the *Edgar*. The armament will contain only three torpedo tubes, one on each side and one in the stern. The bow tube has been abolished in view of recent theories regarding its danger to the vessel herself and of the experience that too many tubes are unnecessary and extravagant of space. Thus we have come down from eleven tubes in small torpedo gun vessels, of ten years ago, to three in big cruisers of to-day. The armament will consist entirely of quick-firers, the heaviest being fifteen 6-in. guns. The *Blake*, the *Edgar*, and the *Powerful*, each have bow and



stern chasers of the 9-2-in. breech-loading type, as well as their broadside 6-in. guns, of which the two earlier classes carried ten and the later is intended to carry twelve. The twelve three-pounders allotted to the new vessels is a less complement than that carried by any of the others named. We see, therefore, that though two 6-in. guns will be added to the armament carried by the *Edgar* and the *Blake*, that balance of advantage is lessened by the lighter bow and stern guns. The defence will be better than that of these ships and the sea speed is likely to be higher both from the greater length and from the fact that so little difference is made in armament for the extra displacement, for that must be used up somewhere, and it will probably be found to have been taken to give more boiler power and therefore a better chance of maintained high speed.

#### The American Navy

is to be augmented by two new battleships, half a dozen gunboats, three torpedo boats and a tug, whilst the experiments in submarine navigation are to be pressed forward. The *Holland* boat, which is to cost over 150,000 dol., is to be finished next year. She is 80 ft. long, and has two sets of machinery, steam for ordinary work when above water, or rather when on water level, and electric for the occasions on which she makes her dive. The intention is not to drive her at any greater depth than is necessary to conceal her from observation.

The battery for the defence of Sandy Hook is now complete. It is armed with sixteen mortars and a 12-in. gun, besides quick-firers. The mortars are designed to throw a 1,000 lb. projectile.

#### The Austrian Navy

is to be reinforced in a fortnight's time by a coast defence ironclad named the *Monarch*, built at Pola, and now almost ready for launching, which is to have a displacement of 5,500 tons and engines of 8,500 I.H.P. under forced draught. Her armament is to include four 24 cc. Krupp guns in two turrets and six 15 cc. quick-firers. The maximum thickness of her armour will be 10½ in. Two sisters to this vessel are building at Trieste under the names of *Wien* and *Budapesth*. This Government has also ordered from Messrs. Yarrow a first-class torpedo boat of a length of 148 ft. The boilers are to be of the water-tube type under the Yarrow patent.

#### The German Navy

will have a busy time at the Kiel festivities when the Baltic Canal is open in June. Including their own ships and the visitors, over a hundred "sail" are expected to be present. The canal certainly deserves all the ceremony that can be brought to bear on its opening. It must be a matter of the greatest strategic importance to effect a saving of nearly two days in the transit from Hamburg to the Baltic, not only for warships, but also for the Mercantile Marine. When we consider that in wartime the vessels of the German Navy will be passed through a canal in their own territory instead of through dangerous seas probably guarded by an enemy's fleet, the enormous advantage it will give becomes apparent. A much smaller force than heretofore will efficiently guard both the Baltic and North Sea Coasts. The engineering difficulties have been considerable as there have been interferences with railways and common roads whilst the problem had to be solved as to how the canal would best overcome the fact that one of its ends is in the tideless Baltic and the other in the North Sea where there is a considerable rise and fall. This difficulty has been met by two sets of locks which are contrived to be the least possible hindrance to the passage of vessels.

On the 3rd of April the *Aegir*, formerly known as the "T," was launched at Kiel by the German Emperor. She is a vessel of 3,490 tons displacement and of 4,800 I.H.P., carrying three 19-ton breech-loading guns and six quick-firers. She is classed as a third-class battleship and is one of a numerous class in the German Navy of which one of the latest is the *Odin*.

The German Admiralty has plans out for an armoured clad of an improved Brandenburg type, of an armoured cruiser, and of three cruisers of the *Gefion* pattern.

#### Trooping.

There is some little pressure being brought to bear on the Parliamentary representatives of Portsmouth, to make them use their best efforts to get the Government to reconsider the arrangement by which the Indian trooping business was taken to Southampton. The transfer was effected very quietly, and there was no great outcry made at the time. But no doubt the tradesmen of

Portsmouth feel the loss very appreciably, and they are well advised to see if they cannot have back at least some part of the trooping business, which was very efficiently conducted from their port for a very long series of years.

An advertisement has been issued by the director of transports asking for tenders of three steam transports, capable of a sea speed of at least 13½ knots on the voyage to Bombay, for the Indian trooping season of 1895-6. The vessels must be at least 5,000 tons, and must have electric lights throughout. The period they will be taken for will be six months certain, from September next. Last year the trooping was very well carried out by the old *Malabar* and four merchant steamers. I have not yet heard why only three are wanted this season.

#### Chatham Dockyard.

The work on the new battleship *Magnificent* is being rapidly pressed forward, and the erection of the engines on board is nearly completed. She will, unless something unforeseen occurs, be ready for her trials in a couple of months. A new induced draught system is being fitted to her boilers and so there will be special interest attaching to her trials.

It is a very satisfactory answer to the recent scare about the intended abolition of the new practice of building engines in dockyards to be able to state that a couple of thousand pounds is to be spent at Chatham on the enlargement of the machinery and boiler shops. Whilst encouragement should certainly be given to private contractors to provide machinery for the Royal Navy, it must not be forgotten in the time of war our resources of every kind would be enormously taxed and the more shops there are capable of doing work for the Navy the better for the country. Expedition too is vital, and probably the value of having shops capable of executing repairs on the spot would be very great when the ships came in to refit after a general action. It would therefore have been exceedingly false economy to discourage work in the Royal yards altogether, because there might be an apparent economy in having it done elsewhere.

The War Department's torpedo factory at Chatham is to be removed from Chatham to Gillingham to make room for an extension of the Naval Barracks.

Work on the new second-class cruiser *Minerva* is being pushed on, and a few weeks more will see her ready for launching.

#### Launches.

The present time sees three additions to the Royal Navy. The most important is that of the battleship *Renown*, which, earlier in these Notes, I spoke of as being nearly ready at Pembroke. She is of 12,350 tons. Of the same length and draught as the *Royal Sovereign* class, her beam is 3 ft. less. She will carry four 10-in. breech-loading guns, ten quick-firers, and twenty smaller guns. She is to have an estimated speed of 18 knots, which is half a knot faster than the beamier vessels, and that with only 12,000 I.H.P. Her coal capacity is unfortunately only 800 tons. Messrs. Maudslay, Son, & Field are responsible for the engines, and considering that she has been 27 months on the stocks her machinery should be well forward.

On the 25th April, Devonport saw the launch of the sloop *Phaniz*, one of the 13½-knot vessels, which are built for police duty and not for war services. At the same time the second-class cruiser *Talbot* took the water. She is a sister to the *Minerva*, building at Chatham. There are six of these craft building altogether in public and private yards. Their displacement is no less than 5,600 tons, which is that of the *Australia* and her belted sisters of the Jubilee year.

#### The Australia.

Speaking of this vessel it may be well to record her visit to Havre to pay respect to the French President on his return to the town where he made his fortune and his name. The exigencies of space and the draught of water made it impossible for us to be represented by anything larger than this vessel, and even she had to discharge weights to take up her position. The President paid a visit to the British ship and took a most intelligent interest in all he saw, whilst great hospitality was shown to the *Australia's* officers by our French friends.

**The Institution of Civil Engineers.**—From a revised list it appears that there are now on the books of the Institution of Civil Engineers 6,737 members of all classes, there being 17 Honorary Members (including five princes of the blood), 1,863 Members, 3,687 Associate Members, 355 Associates, and 816 Students.

## NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from March 27th to April 23rd, 1895:—

Allen, J. W., staff engineer to the *Vivid*, to date March 23rd.  
 Andrews, W. J., staff engineer to the *Vivid*, for the *Rupert*, undated.  
 Atkins, A. E., assistant engineer to the *Excellent*, additional for torpedo and hydraulic course, to date April 6th.  
 Barr, Ernest, engineer to the *Royal Sovereign*.  
 Bearblock, C. W. J., engineer to the *Pique*, to date April 23rd.  
 Bennett, J. M. C., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.  
 Bluet, P. W. P., assistant engineer to the *Pembroke*, to date April 4th.  
 Burner, Alfred, engineer to the *Nile*.  
 Canter, W. J., inspector of machinery to the *Victor Emanuel*, additional.  
 Chase, John E., staff engineer to the *Wildfire*, for the *Sans Pareil*, undated.  
 Cook, H. J., staff engineer to the *Tamar*, to date March 28th.  
 Coope, W. T., fleet engineer to the *Melpomene*, to date April 4th.  
 Crichton, George A., assistant engineer to the *Wildfire*, for the *Sans Pareil*.  
 Dawson, T. J., assistant engineer to the *Thunderer*.  
 Duke, D. E., assistant engineer to the *Pique*, temporary, to date April 23rd.  
 Elbrow, G., staff engineer to the *Emerald*, to date April 4th.  
 Ellis, M. W., staff engineer to the *Pique*, to date April 23rd.  
 Fielder, John, staff engineer to the *Blenheim*, to date April 23rd.  
 Fincham, W. C., staff engineer to the *Orlando*, to date April 23rd.  
 Gardner, John, staff engineer to the *Excellent*, additional, for torpedo and hydraulic course, to date April 6th.  
 Garwood, H. T., engineer to the *Teaser*, to date April 6th.  
 Grantam, C. F. D., engineer to the *Wildfire*, for the *Sans Pareil*.  
 Harding, W. J., fleet engineer to the *President*, to date April 17th.  
 Haves, E., assistant engineer has been promoted to the rank of engineer in Her Majesty's fleet.  
 Head, Ernest A. W., engineer to the *Lightning*, to date March 30th.  
 Hirst, J. E., staff engineer to the *Illustrious*, to date April 4th.  
 Jennings, R. S., engineer to the *Bentley*, to date April 4th.  
 Jones, J., staff engineer to the *Jupiter*, to date March 23rd.  
 Juniper, W. V., chief engineer to the *Karrakatta*, to date April 2nd.  
 Kerwell, G. T., engineer to the *Endymion*, to date April 6th.  
 Kingsnorth, A. F., engineer to the *Circe*, to date April 23rd.  
 Lamb, F. E., assistant engineer to the *Pique* (temporary), to date April 23rd.  
 Lashmore, H., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.  
 Look, H. J., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.  
 Mallinson, E. D., assistant engineer to the *Excellent*, additional for torpedo and hydraulic course, to date April 6th.  
 McCarthy, J., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.  
 Meadus, W. H., engineer to the *Ardent*, to date April 4th.  
 Mogg, W. G., chief engineer to the *Excellent*, additional for torpedo and hydraulic course, to date April 6th.  
 Moorshead, H. B., assistant engineer to the *Excellent*, additional for torpedo and hydraulic course, to date April 6th.  
 Morison, R. B., assistant engineer to the *Excellent*, additional for torpedo and hydraulic course, to date April 6th.  
 Page, W. H., assistant engineer to the *Excellent*, additional for torpedo and hydraulic, to date April 6th.  
 Peacock, David, engineer to the *Spitfire*, to date March 30th.  
 Pearce, R. H., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.  
 Pedrick, J. R. J., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.  
 Pill, J. H., chief engineer to the *Minerva*, to date April 23rd.  
 Rattey, W., assistant engineer to the *Excellent*, additional for torpedo and hydraulic course, to date April 6th.  
 Sercombe, F. J., engineer to the *Repulse*, to date April 23rd.  
 Stansmore, H. O., fleet engineer to the *Glatton*, to date April 4th.  
 Stuttaford, F. R., engineer to the *Victory*, to date April 4th.  
 Thomas, Elijah, staff engineer to the *Excellent*, additional for torpedo and hydraulic course, to date April 6th.  
 Thumwood, Lewis E., engineer to the *Porcupine*, to date March 30th.  
 Travers, A. E., engineer to the *Blenheim*, to date April 4th.

Underhill, C., staff engineer to the *Volage*, to date April 4th.  
 Vibert, J. E., acting engineer, has been confirmed in the rank of engineer in Her Majesty's fleet with seniority of September 1st, 1893.  
 Walker, H. J., staff engineer to the *Thunderer*, undated.  
 Wall, Henry, engineer to the *Hibernia*, additional.  
 Whitaker, F. G., fleet engineer to the *Raleigh*, to date March 28th.  
 Whitmarsh, A., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.  
 Williamson, W. K., engineer to the *Bower*, to date April 4th.  
 Wilson, W. A., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.

## HOAR &amp; BROWN'S HARDWOOD MARKET REPORT, APRIL 23rd, 1895.

TEAM :	Timber Loads.	Planks Loads.	Blocks Loads.	Total Loads.
Stock 1st April	5,139	2,005	91	7,235
Landings	700	455	—	1,164
	5,848	2,460	91	8,399
Deliveries	487	322	—	809
Stock 20th April	5,361	2,138	91	7,590

The arrivals during the last month consist of a large Moulmein cargo (going directly into consumption), also one Rangoon and one Bangkok cargo, which are not yet included in above figures. The deliveries are small compared with the same period of the last two years. There has been a fairly good business in floating cargoes, several sales being reported, and the greater part of the forward consignments now on the way have changed hands.

Selections are being made from landed stocks by Her Majesty's Government, which will take up the principal part of the Burmah wood.

The present stock of Bangkok is larger than usual and includes one shipment the condition of which will do a great deal of damage to the growing and well-earned reputation which this class has obtained of late.

Trade in the ordinary way is exceedingly quiet, and with further imports expected, market values may be reduced should shippers decide to realise by means of forced without-reserve sales.

In planks there is a fair business doing. The stocks are large and competition is growing very keen.

MAHOGANY.—The market for Tobasco has been very quiet. although prices are being upheld, and owners are not inclined to make any concessions under the impression that supplies will be short. With Honduras a considerable clearance has been made through channels of a competitive nature, and there is still some likelihood of further opportunities arising for moving off another large consignment very soon. A rise in prices, prophesied by shippers and brokers, appears very remote, considering the large quantities of African and Panama wood being imported, which have a depressing influence upon values.

CEDAR.—There is still a good demand for long straight wood, but other descriptions are inactive. The importations are smaller than of late and prices are likely to keep steady.

PADOUK.—The demand is fitful, though of a limited character. Stocks are very considerable, but being all held under one interest, it is not anticipated that quotations will recede.

KAWRIE PINE.—Some satisfactory business is in progress, and prices are keeping steady. Shippers appear anxious to forward large consignments, but previous experience of depressed markets resulting from this action makes them shy of again taking the risk. Present supplies are just sufficient to prevent fluctuations in prices.

SEQUOIA.—Some planks were offered by without-reserve sales and met with a poor reception, and the same result will attend any further ventures of this kind at the present time. Stocks are much heavier than prospective requirements call for.

AMERICAN LUMBER.—Business is exceedingly quiet, the best grades only showing any activity. Logs of Whitewood are selling fairly well, and also prime walnut logs, but there is no call for inferior parcels.

**GREENHEART.**—Some enquiries are about, and likely to lead to business, but the extent of orders to be obtained now compares very favourably with the business of a few years ago. Stocks remain small, but more than sufficient for requirements.

Business was very quiet indeed previous to the holidays, but has been more active since.

## INDUSTRIAL AND TRADE NOTES.

### THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

**T**HE activity in Clyde shipbuilding and marine engineering industries during April, as measured by the number of launches and trial trips taking place, has not been of more than average character; perhaps, indeed, of less than the average. This is in some measure attributable to the large amount of intricate warship constructional work carried on, and also to a prevalent spirit of unrest and apparent discontent among the various classes of artisans, a subject to which I will return.

The steel trade is well employed, chiefly in supplying the demand for ship and boiler plates, but the competition in securing orders from shipbuilders is very keen, the result being that prices have reached the lowest figures ever known. During the month ship angles of Siemens steel are reported to have been sold at £4 7s. 6d., and ship plates at £4 17s. 6d. less the usual 5 per cent. discount for delivery in Glasgow district. The fresh additions to the work on the books of shipbuilders have had the effect of keeping the prices at these low figures. The steel workers are now working contentedly at the 5 per cent. reduction enforced last month, and a further help to the steel industry is the 5 per cent. reduction which the West of Scotland and Fife-shire coalmasters have effected during the month in the wages of their workers.

The shipbuilding tonnage at present on hand in the various Clyde shipyards amounts to about 800,000 tons, compared with some 265,000 tons at this time last year. In the shipyards of the upper reaches there is a considerable quantity of work on hand which should keep workmen employed constantly for some considerable time.

The yard of the London and Glasgow Co. at Govan is the busiest, that firm having secured more orders than can be laid down for some time to come. The Fairfield Shipbuilding Co.'s yard is temporarily busy owing to the torpedo catchers, on which a great number of men are employed.

Messrs. Robert Napier & Sons' yard is empty, but it is rumoured that this firm is making changes which may possibly affect its condition in a few weeks. Messrs. Mackie & Thomson, Govan, have several small orders on hand, including a steel screw coasting steamer of 600 tons for Messrs. R. B. Ballantine & Co., Glasgow. The engines for this vessel, which are to be of the triple-expansion type, will be supplied by Messrs. Muir & Houston, Glasgow. The Linthouse yard of Messrs. Stephens & Sons is fairly full, the latest contract being for a large dead-weight cargo-carrying steamer for a Hartlepool firm of shipowners.

Work on the other side of the Clyde is plentiful, especially in the yard of Messrs. D. & W. Henderson, Meadowside, and of Barclay, Curle & Co.'s yard at Whiteinch. The latter firm's latest contract is for three steamers, each of 2,500 tons gross, for Messrs. Caw, Prentice, Clapperton & Co., Glasgow.

Messrs. A. & J. Inglis, of Pointon Shipyard, have recently booked an order for a steel paddle steamer, 270 feet long, for the Drogheda and Liverpool Steam Packet Co., intended for their passenger and cattle traffic between Ireland and Liverpool.

Messrs. John Reid & Co. (Limited), of Whiteinch, have contracted to build a screw passenger steamer of 2,800 tons, for the *Campania Sud Americana de Vapores*, of Valparaiso, similar to the *Loa* built by them last year for the same owners. Messrs. Dunsmuir & Jackson, Govan, will supply the machinery.

Messrs. Fleming & Ferguson, of Paisley, whose "Clyde" type of tubulous boiler is being largely ordered by firms abroad, have been instructed during the month by the Blyth Harbour Commissioners to build a new dredger for that port of the twin-screw hopper type.

Messrs. Simons & Co., of Renfrew, continue to be well provided with work of the specialised kind for which this firm is so widely and favourably known.

At Dumbarton, Messrs. William Denny & Bros., Leven shipyard, and Messrs. Denny & Co., of Leven Engine Works, are fairly well employed, two of their latest contracts being a cargo steamship of large tonnage for one of the companies which

have patronised them for many years. Messrs. Denny Bros. have a contract for a large twin-screw steamer for the Russian Volunteer Fleet, similar to the *Vladimir* now being finished by the firm.

Messrs. A. McMillan & Son, Limited, of the same town, secured during the month the order to build a cargo-carrying steamer, of about 5,500 deadweight tons, for Messrs. R. A. Mudie & Sons, of Dundee. The engines for this vessel will be supplied by Messrs. David Rowan & Sons, Glasgow, and will be fitted with Weir's patent feed heaters, &c., and the boilers worked under Howden's system of forced draught.

Messrs. William Hamilton & Co., shipbuilders, Port-Glasgow, contracted during the month to build a steel screw tug steamer for service on the river Thames, the engines for which, of the triple-expansion type, will be supplied by Messrs. David Rowan & Son, Glasgow.

None of the shipyards of Port-Glasgow are at all well occupied by new work; three or four of the yards in fact being all but empty. By some of the firms it is felt that unless work at the present phenomenally low prices is secured in considerable quantity it is much better not to touch it at all.

Messrs. Blackwood & Gordon, Port-Glasgow, continue to find plenty of work for their patent hauling-up slip. They have recently completed extensive repairs to the Clyde Shipping Co.'s twin-screw tug *Flying Eagle*, which was on the rocks on the west coast during the storm two months ago, and they are now busy on the work of lengthening and reboiling and general overhauling a paddle steamer employed in the north of Scotland, to the specifications of Messrs. Pollock & Co., Glasgow. At the same time the firm have been engaged on the annual overhaul of several of the river steamers, including the Glasgow and South Western Co.'s *Glen Sannox*, and the *Isle of Bute*, formerly the *Guy Mannering*, and now owned by the Messrs. Buchannan.

Messrs. S. McKnight & Co., shipbuilders, Ayr, who recently bought the s.s. *Contest*, of Drontheim, which was stranded behind the breakwater at Ayr, and who made extensive repairs on both hull and machinery, restoring her to the 100 A1 class in Lloyd's, have now sold her to a Glasgow firm.

Messrs. Russell & Co., Port-Glasgow, who some time ago laid down a 4,000-ton steamer on speculation have, it is said, disposed of the vessel to a German firm of owners.

Messrs. J. & G. Thomson, Clydebank, are more than ever concentrating their efforts on the construction of the 14,000-ton 23-knot cruiser *Terrible*, and they purpose launching the vessel in the course of the present month. This promises earlier delivery than was anticipated, and in view of this, and also of the approaching launch of the sister cruiser *Powerful*, building at Barrow, special instructions have been given out to the contractors for the new graving docks at Portsmouth that one of these docks must be completed within 15 months' time. In pursuance of this the work of excavating and construction is being pushed on under pressure of night and day shifts. Excepting the new Glasgow graving dock at Ceasnock which will shortly be complete, the new Portsmouth dock will be the only one in existence or contemplated into which these new cruisers can be taken. Messrs. Thomson have contracted to build, for the Russian Volunteer Fleet, a large twin-screw steamer similar to the one also just ordered from Messrs. Denny of Dumbarton.

At Greenock the busiest shipbuilding firm seems to be Messrs. Scott & Co. About mid-month they launched a steel steamer of 2,400 carrying capacity which is the fifth of no fewer than ten vessels ordered by the China Navigation Co., Limited. The machinery for all these vessels being, of course, supplied by the same firm from their well-known Cartabrim Foundry and Engine Works, both sections of their business are busily employed.

Messrs. Caird & Co. continue to make progress with the large vessels they have on hand to the order of their good customers, the P. & O. Co., and the large steamer for the Austrian Lloyd Co. A change in the management of their shipyard has lately been made, Mr. John Carmichael, who has been manager for about seven or eight years, having been asked to resign in order that Mr. William Caird, a partner in the firm, might take up the reins of outside government. Messrs. Russell & Co. have at present their berths fully occupied with vessels, large sailing ships principally.

Wages disputes and wranglings over the ever debatable "demarcation" question, as between carpenter and joiner work, have plentifully occurred during the month, while those already under way when last month's Notes were written, are still undecided. An exception to this is the dispute between shipwrights and joiners in the London and Glasgow Shipbuilding Yard, Govan.

which has now been settled in favour of the shipwrights, according to the decision of the arbitrators. The shipwrights, it will be remembered, struck work owing to joiners being set to work in the cargo space; but subsequently resumed work on the understanding that the matter be reported to the Board of Arbitration, consisting of the referees who decided the disputed points of the list of work between the trades. The decision, being in favour of the shipwrights, is considered satisfactory (by the shipwrights at least), and will form a precedent for future guidance. A strike of shipwrights employed by Messrs. Ramage & Ferguson, shipbuilders, Leith, is proceeding. Thirty-nine of the men have been on strike since the end of last month, but now they have been joined by the apprentices, thirty-three in number. It is stated by the employers that the matter in dispute is that the shipwrights desire to restrict their caulking from 200 ft. per day to 120 ft. per day, and yet maintain the same rate of pay. This the masters consider unfair in face of the fact that they have to compete with the Clyde, where no such restriction exists. At Dundee, shipjoiners to the number of over 100 ceased work on the 19th ult., on account of the refusal of the masters to raise the wages from 7d. to 7½d. per hour. An offer was made to the men that the wages be raised to 7½d. per hour as from 17th May, but at a meeting of the men the compromise was refused.

With reference to the dispute referred to in last month's Notes, between the engineers and boiler-makers at Clydebank, a conference of employers in the Clyde shipbuilding and engineering trades, with representatives from the Amalgamated Engineers and also from the Iron Shipbuilders and Boiler-makers Societies, was held in Glasgow on the 18th ult. The proceedings were conducted in private, but it is understood that the business of the conference was to discuss the merits of the dispute between the engineers and boiler-makers of Clydebank with regard to the performance of certain work on the water-tube boilers at present under construction there for the British Admiralty. Also to suggest—by way of settlement once and for all—a divisional arrangement of work to be observed in the future construction of such boilers in Clyde yards. It appears that the points in dispute have narrowed themselves down to a comparative clear issue, namely, which trade shall fit the elements together. It seems to be generally admitted that the preparation of the elements, lathe work, &c., belong by rights to the engineers. In order to get over this point temporarily, it was proposed that each side should take week about at the work until a final decision had been arrived at. There is every probability of the question being made the subject of a reference under a mutually chosen arbiter. So far as the employers are concerned they maintain a perfectly neutral attitude on the question.

One of the Glasgow daily papers which as a rule regards every question from the interested standpoint of "How does this affect the working man?" in a recent issue makes much of "How a Clyde order was lost." It relates a very simple story in a very elaborate way, and the whole account is a covert "lecture" to the Clyde workmen, on "the importance of being earnest," reasonable and industrious. The managing director of a prominent shipbuilding firm on the upper reaches recently went to London and arranged details of a contract for building a steamer of considerable tonnage. Points regarding design, engines, and cost were all settled when the question of time arose. The Clyde manager said seven months. This did not suit the owners; they wanted delivery at the end of four months, to meet the autumn trade. "The manager explained how it was impossible to guarantee delivery in that time on account of the erratic style in which the ironworkers in his yard, and indeed all over the Clyde, worked nowadays. If he could rely upon the 'black squad' working with regularity he could promise the vessel in four months, but not under the system they presently adopted. The owners said they would have no difficulty in getting the vessel built on the Tyne within four months, and to-day the Clyde is one order the poorer. The manager, by the way, argued the advantage of having a Clyde-built steamer, but the owners turned round and asserted that good vessels could now be built on the Tyne as well as on the Clyde. For a couple of years or more there has been constant annoyance in the yard referred to, owing to the platers, riveters, and riveters' boys taking holidays as they pleased. After each pay no fewer than 200 men and boys were absent from the yard for three and often four days. To such an extent has this unsatisfactory system prevailed for a few years in another and an old-established yard, that the firm

has lost extensively; and, if rumour be correct, they are endeavouring to privately sell the business.

The torpedo-destroyer *Sturgeon*, the production of the Naval Construction and Armaments Co., Barrow, has been in the Clyde for over a month running her various speed and coal-consumption trials. She left the Clyde on the 19th ult., for Barrow. She underwent her official speed trial on the 11th inst., and attained the phenomenal speed of 29½ knots—equivalent to 34½ miles per hour—the best yet attained by these swift torpedo destroyers. A slight hitch took place in connection with her counters before the three hours' trial was finished, and the Admiralty will insist on the trial again taking place. The weather during the *Sturgeon's* sojourn on the Clyde has for the most part been too rough for getting the best results as to continued high steaming in these speedy craft, and hitches have not been infrequent.

At the Parkhead forge of Messrs. Wm. Beardmore & Co., the manufacture of armour plates by the Harvey process—under licence from the patentees—will shortly be begun. Nickel-steel plates up to a considerable weight and thickness have already been pretty extensively made for the war vessels in the hands of private shipbuilders, but as the Harveyised plates are now so much in request, the firm are preparing their works for this make of plating. A hydraulic forging press of 13,000 tons capacity—the largest in the world it is believed—is now being laid down. The pumps and other items are already prepared, including a large hydraulic cylinder, cast of nickel steel, 74 in. in diameter, and weighing over 60 tons, made by Messrs. Beardmore themselves; being the first cylinder ever cast of this special material.

Messrs. Alley & MacLellan, of the Sentinel Works, Polmadie, Glasgow, are kept busy with numerous orders for their new horizontal type of steering gear and for the patent "Sentinel" Multiple Feed-water Filter and Oil Separator, one of their most recent patented specialities for which, notwithstanding, a large number of orders have already been received.

The extensive steel works at Wishaw at the time of writing are about to be closed for a period not yet fixed. The works have just been entirely reconstructed and converted from the basic to the Siemens' process. It is proposed to make still further alterations and extensions. It is, however, very generally supposed that had prices been at all satisfactory, any extensions still required would have gone on while the steel was being manufactured.

Messrs. Alexander Hall & Co., of Aberdeen, have secured the contract for the reconstruction of the Dundee sailing-ship *Lorna Doone*, which has been purchased for an expedition to the North-East of Siberia, under the direction of Captain Wiggins, the celebrated modern navigator. The *Lorna Doone* will be fitted up with double compound engines and all the other appliances necessary for her transformation into a steamer. Messrs. Hall & Co., it may be stated, had the fitting up of the *Windward* previous to that vessel proceeding in the Jackson-Hainsworth expedition to the North Pole. Captain Wiggins shortly pays a visit to Aberdeen to arrange for the improvements on the *Lorna Doone*. His preference for Peterhead seamen is well known, and no doubt he will endeavour to secure the services of these hardy mariners for this his latest expedition.

In connection with the formidable and praiseworthy scheme of Clyde purification, towards which end the Town Council of Glasgow has already achieved an important step in dealing with the sewage of that part of the city north of the Clyde, it is worthy of note that the Council will shortly consider the question of the disposal of the sewage on the south side. A scheme is in preparation with a view to its treatment in a manner similar to that now in operation on the north side of the city. A very interesting, and it is thought by some a conclusive, bit of testimony to the cleaner state of the river since the sewage scheme came into operation, consists in the fact that on two separate days last week a number of fish, alive and seemingly healthy, were caught in the dock at Meadowside Shipyard; also in Cessnock and Queen's Dock. At rare intervals of late years trout have been got alive at the mouth of the Kelvin, but on this occasion a shoal of braise or roche has come into the harbour. In the office of Mr. Deas, engineer to the Clyde Trust, five specimens have been preserved in a basin, the longest being about 9 in. and weighing fully ½ lb. One of the fish caught at Partick, and still alive, measures 18 in. long. The opinion is that the fish came from Uddington district, where braise are plentiful, and that they got so far down the Clyde is no doubt in some way associated with the present state of the partially purified river.

## TRADE NOTES FROM THE TYNE, WEAR, TEES, HARTLEPOOLS. &c.

(From our own Correspondent.)

### THE TYNE.

**Shipbuilding.**—A more hopeful feeling has arisen among persons connected with the shipping trade, and it is scarcely to be wondered at that the circumstance has tended to produce a greater show of confidence among shipbuilders. The main ground for the improved tone in business circles appears to be the prospective early signing of the peace settlement between China and Japan, and there certainly seems to be some reason for believing that this event is likely to have a stimulating effect upon trade generally. The large war indemnity secured by Japan will enable the latter power to increase her resources of offence and defence both by sea and land, and in carrying out a programme of this description, she will doubtless freely avail herself of the ready assistance obtainable from English steel makers, ordnance manufacturers and shipbuilders. The opening of several additional ports in China for trading purposes must of course also have a stimulating effect on business in most parts of the world, although some time must necessarily elapse before any influence resulting from this point in the peace proposals can be felt. It remains to be seen whether the expectations formed regarding improved trade will be realized; but if we may hazard an opinion on the matter, we do not think that any appreciable improvement will be noticeable before the autumn.

At the Elswick and Low Walker yards of Messrs. Armstrong, Mitchell & Co., the improvement in business referred to in previous reports this year shows further development, especially at the last-named establishment, where a night shift has been put on in the frame-turning department, and the number of hands employed in most of the other departments, has been largely increased. It is stated that the two oil-carrying steamers ordered from the company by Messrs. Samuel, of London, and which are now in course of construction, will be the largest vessels yet built for the trade. A large cruiser, which was put down at the Elswick yard on the speculative principle, and which is now in advanced stage of construction, has been sold to the government of the Argentine Republic. The vessel, which is a splendid specimen of her class, has been altered to suit the requirements of the purchasers, among other additions that have been made, being a complete outer sheathing of teak wood. The torpedo destroyer *Swordfish*, which was launched a few weeks ago, is being got ready for a preliminary trial, and the other vessel of the same class which is still on the stocks, is being prepared for launching. The company are putting down new plant of a very massive description for dealing with the heavy classes of work which have now become so preponderating a feature in ship construction.

At Hebburn the industrial situation has brightened up considerably, Messrs. R. Stevenson & Co. having obtained an order for 10 Russian barges of large carrying capacity, which are to be sent out to their destination in sections. There were 23 of these barges to be built, 3 of which were secured by a firm on the Clyde, 10 by the Hebburn firm as stated above, and 10 by the Union Shipbuilding Co., of San Francisco. It is perhaps of interest to state that the price quoted by the latter company was lower than that obtained by either the Scotch or the English firm. It is understood that delivery by a comparatively early date has been stipulated for, and in view of fulfilling this requirement with the utmost possible promptitude, the Hebburn firm have lost no time in putting the work in hand. At Messrs. Hawthorn, Leslie & Co.'s yard great activity now exists, the amount of work in hand—all of which is of an exceptionally costly description—being very considerable. The yards of Messrs. Wigham Richardson & Co., Messrs. C. S. Swan & Hunter, and the Palmers' Shipbuilding and Iron Co., Limited, continue fairly busy, one of the vessels in hand at the last-named establishment being intended for employment in the Norwegian tourist service. The work of two large vessels at the Tyne Shipbuilding Co.'s yard is progressing rapidly, and at Messrs. Readhead's yard the work on the stocks is sufficient to keep a full complement of hands employed. Messrs. Wood & Skinner are about to resume operations after a temporary stoppage caused by want of orders, and there is some prospect that business will be resumed at the Scotswood Yard before the end of the year.

The new graving dock of the Wallsend Slipway and Engineering Co. has been pretty constantly occupied since the opening, the exceptional facilities provided for the accommodation of large vessels having induced the Hamburg American Co. and other owners to send several of their biggest ships there to be painted or repaired.

**Engineering.**—The engineering works of Messrs. Hawthorn, Leslie and Co., at St. Peter's and Forth Banks, continue very busy, and at the Neptune Works, and the Wallsend Slipway Works, some additional orders have been secured. The Palmer Co.'s engineering department is fairly well employed, and the same may be said respecting Messrs. Readhead's works, and the North-Eastern Marine Engineering Works at Wallsend. A further order for locomotive engines and accessories from South America has greatly improved the state of business at Messrs. R. Stephenson and Co.'s works, and at Messrs. Black, Hawthorn & Co.'s establishment, Gateshead, there are also signs of increasing work. The various departments of Messrs. Carriok & Wardale's works are kept in steady operation.

Messrs. Clarke, Chapman & Co. continue to secure a good share of such work, in their special line, as is in the market, and all their departments are tolerably brisk. Since the beginning of the present year their gas and oil engine department has been specially active, orders for both types of engines having been very numerous. The oil engine is admirably adapted for driving dynamos, and it is simple in construction, as well as effective in action.

Messrs. Wm. Hindson & Co., hydraulic and general engineers, South Shore Road, Gateshead, have now more work in hand than at any time since the opening of their works some 16 months ago.

There is scarcely anything in the way of ship or colliery engineering repairs that they do not undertake, and the excellent facilities at their command enable them to execute contracts with exceptional economy and dispatch. Mr. John Welch, of No. 3, Back Ord Street, Newcastle, manufacturer of ships' tanks, ventilators, &c., continue to have a fair share of such business as is to be had, in the present rather depressed state of shipbuilding, and other manufacturers in the same line are doing moderately well.

**Blyth.**—The graving docks at this rapidly developing port have been almost constantly occupied during the past few weeks, vessels having been undocked and replaced by others, quite frequently in the same tide. In the shipbuilding yard business is quiet but there is little reason to doubt that as soon as trade begins to revive this establishment will participate in any improvement that may take place. Coal shipments have been kept up to a fair average lately, in spite of the fact that many of the surrounding collieries have been on short time.

**Electric Lighting.**—Messrs. J. H. Holmes & Co., Portland Road, Newcastle, have recently booked orders for electric light installations on five high-class vessels, building for the Russian Steam Navigation Co., and also an order for an installation on a large passenger vessel in course of construction for the Russian Volunteer Fleet. They have also been commissioned by Messrs. G. Thompson & Co., Clydebank, to light the s.s. *Australasian*, and by the Tyne Steam Shipping Co. to light their new passenger steamer *Grenadier*. Among the contracts recently completed by the firm are the lighting of the steamers *King Orry*, *Mona's Isle*, and *Sunefell*, for the Isle of Man Steam Packet Co. The two first-named vessels are each fitted with 200 16-candle power lamps, which are supplied by a coupled plant consisting of an 8 in. by 8 in. engine, with automatic governor, coupled to a No. 15 dynamo, capable of supplying 180 lamps at 60 volts. The *King Orry* is wired on the single wire, and the *Mona's Isle* on the double wire system. The *Sunefell* is fitted with 125 16-candle power lamps, supplied by a complete plant of a 9½ in. by 8 in. engine (with automatic governor), and a No. 13 dynamo, having an output of 110 amps. at 60 volts. Another recently-completed contract was the lighting of the s.s. *Britannia* for Messrs. Currie & Co., of Leith. This vessel is fitted with 100 16-candle power lamps, in the same style as the s.s. *Bernicia* (which was fitted by Messrs. Holmes & Co. about three years ago). The current for these lamps is supplied by a coupled plant, namely, an 8 in. by 8 in. open automatic engine, coupled to a No. 13 dynamo, with an output of 60 amps. 106 volts. The s.s. *Manx Queen* was also fitted for Messrs. J. Little & Co., of Barrow-in-Furness. The installation in this case consisted of 130 lamps and an equipment of bells. The current is supplied by a 7 in. by 6 in. open automatic engine, coupled to a No. 13 compound wound dynamo, having an output of 135 amps.



at 60 volts. The firm have also sent eight dynamos to the Belfast Exhibition.

#### THE WEAR.

Since last month little change has taken place in the aspect of shipbuilding matters on the Wear, as no new orders have been booked, and no additional work has made its appearance in the yards. It is understood that one of the principal yards on the river is about to have two or three more building berths added, and also a quantity of new machinery put down. At Messrs. R. Thompson & Son's yard a resumption of work has taken place after a prolonged stoppage for want of orders. It is stated that Messrs. Priestman & Co.'s yard is likely to become pretty busy in the course of a few weeks, but at present slackness exists, and there are no tangible signs of improvement to be noticed. Messrs. J. L. Thompson & Sons are having a fair amount of both new and old work in progress, and at Messrs. Blumer & Co.'s yard all the berths are occupied with vessels in various stages of construction. The Sunderland Shipbuilding Co. have one large vessel in course of building, but there does not appear to be any great desire to proceed actively with the work. At the adjoining yard of Messrs. Bartram & Sons there is also one vessel on the stocks, but it is expected that another will be put down shortly.

**Engineering.**—In the marine engineering works business is but moderate, and it is not to be expected that any change for the better will take place till an improvement in shipbuilding sets in. The smaller engineering works are also slack, and foundries are very badly employed. At the Monkwearmouth Ironworks orders are scarce and most of the operatives are on short time. Brass and copper works are moderately well employed, and the outlook for the future is not encouraging.

**The Hartlepoons.**—It is reported that Messrs. W. Gray & Co. have booked some important orders, which will keep the yard of the firm pretty busy for some time to come. Messrs. Furness, Withy & Co. have also secured a couple of good orders, and the outlook at this centre is consequently much improved.

At the Central Marine Engine Works the customary briskness is maintained, the work in hand being so plentiful as to necessitate the putting on of a night shift during part of April. The foundry department is specially active, and a large number of moulders are employed; but contracts are getting rapidly completed, and there must soon come a time of slackness if further orders are not forthcoming. The forge has been kept well employed throughout the first quarter of the year, especially on heavy stern frames and rudders, as well as crank and tail shafts for repair work. Some very remarkable results in the way of dispatch have been accomplished during that period, in the manufacture of tail shafts for vessels undergoing repair at Cardiff. The brass foundry and copper shop have been fully employed, and the high quality of the work turned out has been in accordance with the reputation for excellence which these departments have achieved. The boiler shop has been fairly well employed, but its resources were far from being overtaxed, and a good deal more work could have been turned out if it had existed. Special attention is given at this establishment to boiler work, both with regard to design and the quality of the work in the shop, resulting in repeated and continual expressions of satisfaction from superintending and seagoing engineers who have Central Marine-made boilers under their charge. The pattern-shop has not been fully employed since the termination of the long continued strike last year; but there is a fair amount of work in hand, and extensions are in progress with a view to providing more suitable storage space for valuable patterns.

The new lodge at the entrance gates of the works has been completed, and is now in occupation. The architect's plans for contemplated extensions to the drawing and general offices are almost ready and an early start with this work may be looked for. Since our last report on the work turned out from this establishment, the following ships have made successful trial trips off Hartlepool, and subsequently proceeded to sea:—The s.s. *Maling*, a vessel built by Messrs. W. Gray & Co., Limited, to the order of the West Hartlepool Steam Navigation Co., and having engines 24 in., 38 in., 64 in., by 42 in. stroke, with two large boilers working at 160 lbs. pressure. The s.s. *Rossal*, built by Messrs. W. Gray & Co. to the order of Messrs. Galbraith, Pembroke & Co., London, having engines 23 in., 36½ in., 62 in. by 39 in. stroke, and two large boilers constructed for 160 lbs. pressure of steam. This, it may be added, is the fifth vessel engined at the Central Works for these owners. Following up the list, we come to the s.s. *Haslingden*, built by Messrs. W. Gray & Co. to the order of Messrs.

Burrell & Yeoman, and being a sister ship to the *Thurston* and *Chatburn*, built for the same owners some time ago. She has engines 20 in., 31½ in., 53 in. by 36 in. stroke, and two steel boilers working at 160 lbs. pressure. There was also the s.s. *Rocio*, built to the order of Messrs. Orders & Handford, of Newport, by Messrs. Gray & Co., and similar to the s.s. *Rhio*, previously built for the same firm. Her engines are 18 in., 28½ in., 47½ in. by 30 in. stroke, and she has one large steel boiler working at 160 lbs. pressure. This is the third vessel built by Messrs. W. Gray & Co. for these owners. There have also been several ships steamed at the sheerlegs, including the s.s. *Romsdalen*, built by Messrs. Gray & Co. to the order of Messrs. G. B. Harland & Co., and having engines 22 in., 35 in., 59 in. by 39 in. stroke, and two steel boilers working at 160 lbs. pressure. The s.s. *Dorrie*, built by Messrs. Gray & Co. to the order of Stainthorpe, Kitching & Co., of Stockton, having engines 23 in., 36½ in., 62 in. by 39 in. stroke, and two large boilers; and the s.s. *Arion*, built by Messrs. Furness, Withy & Co., to the order of Messrs. Rickinson, Son & Co., of West Hartlepool, having engines 23 in., 36½ in., 62 in. by 39 in., and two large steel boilers.

A good deal of repair work has been carried out at the works this year, including new boilers to old vessels and alterations to existing engines so as to render them suitable for higher pressure. The s.s. *Scandinavian* is now in hand at the sheerlegs department, receiving new boiler and getting cylinders reduced for the purpose named.

**Stockton.**—Messrs. R. Ropner & Sons are reported to have made another addition to their order-book lately, and one or two other firms in the neighbourhood are said to have been equally fortunate. In the engineering works business is, with one or two exceptions, somewhat dull; but some of the boiler and bridge works continue to do a steady trade. Rolling mills are scarcely so well employed as at the close of last year, and there seems little likelihood of any return of prosperity just yet.

**Middlesbro'**—Since last month a few more shipbuilding orders have come to this centre, among them being one for a twin-screw steamer, of somewhat small dimensions, which is on foreign account from Messrs. Sir Raylton, Dixon & Co. Messrs. Craggs & Sons have secured an order for a twin-screw passenger steamer, to be employed on the service between Plymouth and the Channel Islands, and they have also a tugboat to build for London owners. Messrs. Harkess & Sons have very little work on hand at present, but they are tendering for contracts—both new and old—and expect soon to have something to go on with. Messrs. Westgarth & English have recently booked orders for several sets of engines of a small type, and an accession of briskness at their works is expected. At other engineering establishments business is quiet, and foundries are only showing a moderate state of briskness. At the docks there are beginning to be noticeable indications that the season of timber imports is at hand—indeed, a few cargoes have already arrived and been discharged.

**Darlington.**—Though there is no work of a very special character just now in progress at the Darlington Forge Co.'s establishment, there is considerable activity in all the departments, the forge and machine shop being so full of work as to necessitate the running of the machinery day and night. In the foundry department there is also a good supply of work. Other engineering establishments at this centre are for the most part only indifferently employed.

#### THE MERSEY.

(From our own Correspondent.)

**A**LTHOUGH the marine engineering and shipbuilding industries of this district do not at present appear to be participating in the improvement which is reported from some other important centres, the outlook of the general engineering trades is certainly more satisfactory than it has been recently. A decidedly more hopeful tone prevails in many quarters, and new work is coming forward rather more freely in most departments. Stationary engine builders are fairly well engaged, machine-tool makers are securing an increased weight of new work, and in the boiler-making and locomotive building trades there are more orders stirring. The returns of the engineering trades' union organisations also indicate a general improvement in the position, both the Amalgamated Society of Engineers and the Steam Engine Makers' Society reporting a substantial decrease in the number of unemployed members on the books. This decrease is perhaps not so marked in the important



centres of Liverpool and Manchester, but in most of the Lancashire industrial districts there has been a steady lessening of out-of-work members with increasing enquiries for workmen. The returns of the Amalgamated Society of Engineers for the whole of the branches throughout the county show a reduction of 1 per cent. on those of the previous month in the number of members in receipt of out-of-work support, this not now amounting to more than 7 per cent. of the total membership, and the report of the Steam Engine Makers' Society is also much to the same effect, showing a decrease of 1 per cent., the total number of members in receipt of donation benefit not now being more than 4 per cent. of the membership. This much more satisfactory condition as regards employment returns may, however, to some extent be discounted by the large increase in the number of members thrown on the sick funds, mainly through the recent influenza epidemic, as there is no doubt that to a considerable extent out-of-work members have been finding employment owing to other members who had previously been employed being thrown out through sickness. The outlook, however, in all the reports of the trades' union societies is regarded as much more encouraging than it has been, and there are confident anticipations of steadily increasing activity as the year advances.

In the shipbuilding industry, as already stated, there is still no particular sign of improvement to notice, and the only item of interest is the launching during the month by Messrs. Laird Bros. of a despatch vessel for the Portuguese Government. This vessel, which is built of steel, and is named the *Salvador Correia*, has been designed to meet the requirements of the Portuguese colonial service on the African coast, and the work is being carried out under the superintendence of Captain Azevedo Continbo, of the Portuguese Royal Navy. The vessel is about 300 tons B.M., and 480 I.H.P., and is to be completely fitted in the matter of armament, electric search-lights, signalling apparatus, &c. Messrs. Laird Bros., it may be added, have during the past twenty-five years built seventeen vessels, including the *Salvador Correia*, for the Portuguese Government.

The application of electricity for mechanical purposes has made nothing like the same progress in this country as on the Continent, and in the United States. In one important direction its application as the motive power for operating overhead travelling cranes, which is already extensively adopted in America and on the Continent, it has made only very slow development. Of course a number of cranes have been erected during the last few years, driven by electric motors, but so far these can scarcely be regarded as really electrically driven cranes, compared with the much more perfectly designed and completely equipped apparatus elsewhere. Messrs. Vaughan & Son, of the Royal Iron Works, Gorton, Manchester, have, however, just completed for the Woolwich Arsenal an electric crane possessing several features of novelty which it may be interesting to notice. The special feature of this crane is the application of three separate electric motors placed in suitable position for giving respectively longitudinal travel in both directions to the crane, cross traverse in both directions to the crab, and for operating the hoisting and lowering motions, each motor being capable of being reversed. The Government have already a single-motor electric-driven crane at the Woolwich Arsenal, but the one just completed by Messrs. Vaughan & Son is the first which they are erecting with three separate motors, and it is a crane to lift seven tons with a span of 30 ft., and weighing about nine tons. The advantage of this crane over the single motor, and the ordinary rope-driven cranes, is that it dispenses with a considerable amount of gearing, which necessarily absorbs a good deal of the driving power, and as compared with the rope-driven cranes, it dispenses altogether with the headstock, belt and rope pulleys, counter shafts, longitudinal cross shafts and shaft supports, the only gearing required being a sufficient complement of wheels to regulate the speed as required, a switch box and resistance chamber being provided with each motor for regulating the current proportionate to the speed of running required. All the operations are controlled from the floor by means of chains dependent from the switches, from one part of the crane, within easy reach of the attendant. The firm are also just completing another crane which is to be rope-driven, for lifting five tons, and having a span of 60 ft. It may be added that Messrs. Vaughan are at present carrying out an extension of their works by the building of a new erecting shop of 200 ft. long by 50 ft. wide, which will be traversed from end to end by a 20-ton electrically-driven overhead crane constructed on similar lines to the one described above.

The various appointments of labour representatives to the magisterial bench, which have been made during the last year or two, have naturally given considerable satisfaction to the different trades' union organisations. The latest appointment was that of Mr. James Swift, the general secretary of the Steam Engine Makers' society, and at the quarterly meeting of the executive council held during the month, he was presented with a handsomely illuminated address signed by the members of the council on behalf of the society, offering him their warm congratulations on his appointment as Justice of the Peace for the City of Manchester, the selection being regarded as a well-deserved tribute not only to his high character as a citizen but also to his ability as a trades union official and a compliment to the society when its seventieth anniversary had just been celebrated. Mr. Swift, in a few pertinent remarks acknowledging the presentation, said he could not claim that his recent appointment had been conferred upon him as a prominent citizen, or for service rendered to any particular party in the State, but it was really a compliment to a society with a seventy years' history behind it, and was paid through him, as its chief officer. If they looked backwards, they would find that ten years ago the position of magistrate was reserved for capitalists and partisans, but since then public opinion had advanced, and representatives of working-men were now to be found on the Commission of the Peace in all parts of the country. His short experience on the Bench told him that dealing with the chronic evildoer was only a limited part of the magistrate's duty. A large number of minor causes had to be dealt with of which the general public heard little, and it was in these cases that the necessity for direct contact with the working class, became apparent. There was in such instances a need on the part of those who had to adjudicate upon them, of a knowledge of the surroundings of the labouring part of the community, and if need be to act as their advocate rather than they should be deprived of their liberty when not able to at once meet even a limited penalty owing to their limited resources.

In the iron trade a much more hopeful feeling has prevailed during the month than for some time past, and a fair amount of business has been put through in pig-iron, with a hardening tendency in prices, some brands being now 6d. to 1s. stronger than last month. Local makers of pig-iron report no improvement with prices very little better, but in district brands there is a stiffening tendency, a moderate business having been put through; and makers have in some cases put up their quotations 6d. to 1s. per ton, forge Lincolnshire now averaging 38s. 6d., and foundry 38s. 6d., with foundry Derbyshire about 42s. 6d. net cash delivered Manchester. Outside brands are also stronger, good foundry Middlesbrough being now quoted 43s. 4d. to 43s. 10d. net cash delivered Manchester, with Eglington and Glengarnock about 46s. net prompt cash delivered Lancashire ports.

In the finished iron trade rather more business is reported in some quarters, but generally forges are but poorly employed. Prices, however, although low, are firmer than they have been, Lancashire and Staffordshire bars averaging £5 to £5 2s. 6d.; sheets, £6 12s. 6d., and £6 15s. to £6 17s. 6d. for Lancashire and Staffordshire qualities with hoops; £5 15s. to £6 for random and special cut lengths, delivered Manchester district, with 2s. 6d. less for shipping orders.

Only a slight improvement is noticeable as regards the steel trade, with ordinary foundry hematites obtainable 51s. 6d. to 52s. less 2½, although more is quoted for one or two special brands; billets £4 for common qualities, and steel boiler plates about £6, delivered Manchester district.

In the metal market there is a moderate enquiry, with a tendency to harden up in prices owing to the stiffening in raw material, but as yet there is no quotable change, list rates for delivery in the Manchester district being as below:—Solid drawn brass boiler tubes, 5½d.; solid drawn brass surface condenser tubes, 7d.; solid drawn copper tubes, 6½d.; brazed copper gas and steam tube, 6½d.; brazed brass gas tube, 6½d.; brass wire, 5d.; copper wire, 6d.; rolled brass, 5d.; sheet brass, 6½d.; yellow metal condenser bolts and plates, 4½d.; cut copper nails, 7½d. to 8½d.; wrought copper boat nails, 7½d. per lb.; and copper bolts, £53 per ton.

Business has been quiet in the timber trade, and although the deliveries have been, perhaps, more satisfactory than during the last few months, prices are low, with stocks sufficient in all articles. The arrival of greenheart consists of one cargo of large average wood; there is an easing down in values, with ample stock. In East India teak the deliveries have improved

with supplies ample. Planks continue to arrive too freely and prices are decidedly easier.

In the coal trade the demand has slackened off considerably with an easier tone in prices. House-fire qualities are in only slow request, with best qualities averaging 10s. to 10s. 6d.; seconds, 8s. 6d. to 9s.; and common sorts, 7s. to 7s. 6d. Steam and forge coals also meet with no better enquiry, low prices consequently being taken to secure orders, 6s. to 6s. 6d. being the full average pit prices. Supplies of engine fuel move off fairly well, the output necessarily being very limited, and prices are maintained at 8s. 6d. and 4s. for common sorts, to 4s. 6d. and 5s. for better qualities of slack at the pitmouth.

For shipment there has been only a small weight of business stirring, with prices at an extremely low point, some of the inferior qualities of steam coal being obtainable at as low as 7s. 6d. with better qualities about 8s. delivered at the ports on the Mersey.

## NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

**Barrow-in-Furness.**—There is not much that is new to report in connection with the shipbuilding trade of this district. No new orders have come to hand during the month, and the enquiries from all sources are not only few in number, but are not being given out except at extraordinarily low prices. Some orders during the month have been declined because the prices offered by owners have left no margin of profit. Builders go to the trouble and expense of tendering, and although they quote at a low price per ton they are asked to take less money or lose the work. They prefer the latter alternative. The opinion is held in some districts that much of the tendering which has to be done by makers in dull times is with a view that owners can get at the bottom prices so as to form a data for operations when new tonnage is actually required, on the basis of any rise in the value of building material or increase in the cost of labour which may at the time be the fact.

Some hopes have recently been expressed, and in many instances the belief is entertained that the stoppage of hostilities in the far East will lead to a marked revival in the shipping trade generally. There is some justification for this, as not only have Japan and China much lost ground to pull up, but they have before them a very big programme of developments in the future which cannot but give an impetus to the shipping trade, and as British ships are the chief carrying agencies of the world it stands to sense that we shall get our share of any improvement that may assert itself in the near future. It is felt by those who have ventured to give any thought to this question, that not only will the changed condition of things vastly improve the ordinary shipping trade, but that new developments will follow in improving direct steam navigation with Japanese and Chinese ports. The splendid service of the P. & O. Co., by way of the Suez Canal and India, leaves nothing to be desired in that direction, but it is quite on the cards there will be a marked development in the steamship service across the Pacific—from Vancouver to Yokohama, and from San Francisco to Yokohama. At present the Empress Line, the *Empress of China*, *Empress of India*, and *Empress of Japan*, Barrow-built high-speed steamers, are doing good service on the Yokohama station, but they will doubtless have to be supplemented by additional steamers of equal size, power and general equipment, and this is naturally expected to bring new orders to this country. But over and above this feature of the case, further need will be shown for the new line of steamers from British ports to Canada in connection with the Canadian Pacific Railway Co., from Montreal to Vancouver. This line has been in embryo for some time, and will certainly some day become a realised fact, so soon, indeed, as the Home Government, the Canadian Government, and the Australian group of governments can see their way to such a combined subsidy as will satisfy a British syndicate, which is even now ready to find the necessary capital when these initial conditions have been officially assured. The Australian governments will be asked to join in such a guarantee because of the proposed establishment of a direct line of steamers from Vancouver to New South Wales in connection with express services of trains across Canada and fast steamers communicating between Canadian and

British ports. There is much that is practical in these forecasts of the future, and there is also a certainty that whatever developments are in store for Vancouver as a Canadian port will find contemporary enterprise to meet them in the United States port of San Francisco. It therefore seems likely that the settlement of the war between China and Japan will be the forerunner of great changes in the steam navigation of the Pacific. In these changes British shipbuilders, including those of Barrow, will very naturally profit.

Much better weather has lately been experienced, and this circumstance alongside the fact that days have been gradually lengthening, has enabled builders to make great progress with the work they have on hand. H.M.S. *Powerful*, first-class cruiser, has been fully plated and sheathed with teak wood, and arrangements are in progress for the outer copper sheathing. The main shafts and the twin screws are being prepared for fixing, and it seems probable that the great vessel will be launched in July or August next. The internal fittings of the *Powerful* are considerably advanced, and the vessel will probably have a deadweight when she is launched of from 7,000 to 8,000 tons. The Barrow yard possesses the best launching ground in the world, but to give greater facilities for this launch dredging operations are proceeding in Walney Channel opposite the launching ways which will give ample space in any emergency. This vessel is being built on the ways where the *City of Rome*, the *Normandy*, and the *Empress of India* were built, and is as solid as possible. No trouble from that source is either anticipated or probable. The building of the two sets of engines for the *Powerful* as well as the *Belleville* boilers is proceeding satisfactory and both will be ready for lifting into the vessel when launched. It is noteworthy that the engines, although of triple-expansion type, will each have four cylinders, the low-pressure steam having play on two cylinders in each engine in order to obviate the enormous diameter of cylinder which would be necessary were this not the case. Gradually the two second-class cruisers *Juno* and *Doris* are raising their massive steel sides. Owing to the adequate supply of material much headway is being made with these cruisers. The three torpedo-boat destroyers, *Sturgeon*, *Starfish* and *Skate*, will probably take their trials together in May or the beginning of June. The *Sturgeon* has already shown herself to be one of the smartest, if not the smartest vessel of her class yet built for the Admiralty. Much attention is being devoted to the work of building the *Duke of Lancaster*, the twin-screw high-speed passenger steamer for the Fleetwood and Belfast service. She will be launched early in May, and has to be on her station by June 1st. If this feat is accomplished, as no doubt it will be, it will be one of the smartest performances ever recorded in the history of British shipbuilding. The Liverpool sand dredger is gradually taking shape. Those who have not seen these leviathan dredgers, capable of lifting 4,000 tons of sand per hour into hoppers which are part of herself, and then steaming away to depositing ground and discharging her whole cargo in three or four minutes, have no idea of the size and capacity, the power, and the mechanical arrangements generally, which are brought into play, in order that the vessel can do what is required of her. She will be delivered during the year, and will be a worthy addition to the dredging fleet of the Mersey, which has already done such good service in that river, which is now navigable for the largest ships even at the lowest state of the tide.

During the month the Naval Construction and Armaments Co. delivered to the London County Council the sludge steamer named *Burns*, as a compliment to Mr. John Burns, M.P. On her trial on the Thames this steamer exceeded her specified speed by 2 knots. It is probable that other large cities like London will adopt the metropolitan system of carrying out sludge to sea, as the best means of keeping rivers clear and pure. Manchester is already scheming to this end. Very much progress has been made with the engines of H.M.S. *Majestic* which are being built up at Portsmouth Dockyard. The repairs to the Barrow and Isle of Man steamer, *Manx Queen*, are very considerable. With her new boilers and improved engines it is expected she will make a fast sailer, and reduce the time taken to reach the Isle of Man.

**Shipbuilding Material.**—There is a quiet demand for all classes of shipbuilding material, but it is expected the mills at Barrow will be kept busy during the year with orders for plates for Admiralty and merchant work, and that the brisk demand which has been experienced for some time for heavy steel castings will also be maintained.

## BELFAST TRADE NOTES.

(From our own Correspondent.)

THE shipbuilding and engineering trade here continues brisk, and good trade is the order of the day. The shipbuilding returns issued by Lloyd's for the quarter ended 31st March, 1895, shows that the Clyde, the Tyne, the Wear, and all other shipbuilding centres, are simply not in it with the commercial capital of Ireland. In the returns Belfast is the chief port in which advance has been made, the increase in the quarter of the number of vessel under construction, compared with the corresponding period last year, is 29,568 tons gross, the only other place which has an increase to its credit is Middlesbrough and Stockton, which have improved about 3,000 gross.

A most disastrous fire occurred in the timber yard of Messrs. Harland & Wolff on the evening of the 10th, and was not extinguished till the following evening and till damage to the amount of about £25,000 had been done.

The fire broke out in a yard of about ten acres in extent stored with timber to the value of £40,000, and is situated alongside the fine new boiler shops erected about a year ago, and which were in imminent danger of being destroyed, but thanks to the exertions of the plucky firemen with their four steamers, the fire was confined to one side of the timber. The timber is only partially insured so that the firm will lose heavily by the fire, but it will not in any way interfere with the work of the yard, as about half has been saved.

The *Orissa* had her trial on March 30th, and attained a speed of 15 knots per hour, which was considered very satisfactory. She is a twin-screw steamer of 5,370 tons, driven by two sets of triple-expansion engines of 1,800 I.H.P. each, and has manganese propellers. It is not necessary to say more about this fine steamer. Suffice it is to say that she is a sister to the *Oropesa*, whose trial was reported in our March number, and is owned by the Pacific Steam Navigation Co.

The *Scotsman* also had her trial during the month which was satisfactory in every way. She is a twin-screw steamer, of 6,000 tons gross, and has two sets of triple-expansion engines of 1,500 I.H.P. each, and manganese propellers. The *Scotsman* was built to the order of Messrs. Geo. Warren & Son, Liverpool, and is intended for the North Atlantic cattle trade. After the trial she proceeded to Cardiff to load bunker, after which she sails for Liverpool, and from thence on her maiden voyage across the pond.

The *Germanic* is beginning to get into shape now she has her new engines and boilers in, and her two new funnels up, and presents a striking contrast to her old state. The new funnels being very high give her a very smart appearance; a new deck has been fitted and altogether, when she is completed, will be counted in the front rank of ocean palaces.

Messrs. Harland & Wolff have the s.s. *Caloric*, of the Belfast and Liverpool Line, in for her spring overhaul.

Messrs. Workman, Clark & Co., Limited, of the Belfast Shipyard continue busy; although they have had no launches since last report there are a good many vessels in a forward state in their yards, one of which will be launched in a fortnight.

They are at present erecting a new shed in their South yard, and the new slip is nearly ready for receiving keels. Altogether when their numerous improvements are ready they will have one of the most complete and up-to-date yards in the kingdom.

They have the s.s. *Glenarm*, of the Antrim Iron Ore Co., and the s.s. *Test*, of Messrs. Grainger's fleet in for general repairs.

The Harbour Commissioners are at present extending the new Salisbury Dock through the Prince's Dock and erecting new sheds similar to those at the Dufferin Dock, and when completed will prove a valuable addition to the already extensive quays and docks of the commercial capital.

The fine barque *Lough Neagh* was recently sold to foreign owners for £6,000. She was built of steel in 1892 by Messrs. Workman, Clark, & Co., Limited, and cost £12,000 to build and carries about 2,000 tons.

The barque *Linda Park* was also sold for £3,000.

The Austro-Hungarian Government have recently entered into a contract with Messrs. Yarrow & Co., of Poplar, to construct a first-class torpedo boat of the very latest type. The dimensions are 148 ft. in length by 14 ft. 9 in. beam, and the boilers are to be of the Yarrow water-tube type.

## OBITUARY.

## MR. WILLIAM HENDERSON, SHIPBUILDER, PARTICK.

THE death took place on Sunday, the 7th ult., at his private residence in Partick Hill, of Mr. William Henderson, of the well-known shipbuilding firm of Messrs. David & William Henderson, Meadowside, Partick. The deceased gentleman, who was in his 69th year, and had been mostly confined to his room for about a month past, was the last of four brothers whose names have long been closely associated with the shipbuilding industry. He was predeceased by his brother, Mr. Thomas Henderson, founder of the well-known "Anchor Line," whose obituary was given in our last issue. At an early age Mr. William Henderson acquired a practical knowledge of seafaring life, which stood him in good stead in later years when he entered on his career as a shipbuilder. He took an active part in the formation of the firm of which he was a member, and brought his wide experience to bear upon the work so successfully that the firm of D. and W. Henderson occupy a foremost place among shipbuilders—a class of work for which the firm is specially noted being the construction of high-class racing yachts, both the present and previous America Cup challengers, as well as other noted craft, being from their stocks. Mr. Henderson led a quiet, unassuming life, and the announcement of his demise was received with deep sorrow by a large circle of friends.

## MR. GEORGE THOMPSON, SHIPOWNER, ABERDEEN.

THE death took place at Aberdeen, on the 11th ult., of Mr. George Thompson, founder and head of the well known shipping firm of Messrs. George Thompson & Co., Aberdeen and London. The deceased, who was one of the oldest citizens of Aberdeen, had reached the advanced age of 91 years. He started business in the Granite City as a shipowner, insurance broker and timber importer, and gradually built up a large connection between this country and Australia. He started a line of traders to the colony, and his vessels were amongst the first to make regular trips between the two countries. He was also among the first shipowners in this country to adopt the clipper type of sailing vessels, and for long the clipper bow of the Aberdeen Line was a well-known feature in Australian ports. In 1850 Mr. Thompson was joined in partnership by his son-in-law, Sir William Henderson. A London house was opened four years later, and the partnership had since been extended by the admission of three of Mr. Thompson's sons, and afterwards three of his grandsons. Of recent years the firm have substituted steam vessels for sailing vessels. The s.s. *Aberdeen*, the first steamer in which the triple-expansion type of engines, as arranged by the late Dr. A. C. Kirk, was practically demonstrated to be a success, being one of their first steam vessels. Other steamers fitted with triple-expansion engines have, of course, since been added to the fleet, and the Aberdeen Line is still well and favourably known, Mr. Froude, the historian, paying it a compliment in his work, entitled "Oceana." Mr. Thompson took an important part in the public life of Aberdeen half-a-century ago. He was Dean of Guild in 1840 and 1841, a Town Councillor from 1842 to 1845, and Lord Provost of the city from 1847 to 1850. During his Provostry the Queen made her first visit to the city, landing with the Prince Consort and the Royal children at the Victoria Dock, in 1848. Her Majesty was presented with an address from the Corporation, and Prince Albert with the freedom of the city. An advanced Liberal in politics, he contested the Parliamentary representation of the city in 1852 with Sir Andrew Leith-Hay, and was elected. He remained in Parliament for five years, retiring at the general election of 1857, and declining to again come forward. In recognition of his distinguished services to the community, Mr. Thompson's portrait, painted by Sir George Reid, P.R.S.A., was in the year 1880 presented to the Town Council on behalf of a large body of citizens, who highly valued the work that Mr. Thompson had done. Mr. Thompson had lived in retirement for many years past. He gave up the active management of his firm's affairs in 1866, but he never ceased to follow with interest the fortunes of his native city. He was a liberal supporter of all the philanthropic and charitable institutions of the town.

## LAUNCHES AND TRIAL TRIPS.

## LAUNCHES.—ENGLISH.

**Kurdistan.**—On March 25th Messrs. Short launched at Pallion a steel screw steamer, built to the order of Messrs. J. W. Squance & Co., of Sunderland, of the following dimensions:—Length, 325 ft.; breadth, 43 ft.; and depth, moulded, 27 ft. 3 in. The vessel is constructed to the highest class in Lloyd's Register, on the strengthened spar-deck grade, and was named *Kurdistan*. The vessel is to be fitted with triple-expansion engines, having cylinders 23½ in., 39 in., and 64 in. diameter, with a stroke of 42 in., by Mr. John Dickinson, of Sunderland.

**Turret Crown.**—On March 26th this turret-deck steamer was launched from the yard of Messrs. William Doxford & Sons, Limited, of Sunderland, having been built to the order of Messrs. Petersen, Tate & Co., Newcastle. She will receive the highest class in both the British Corporation and Bureau Veritas registries.

**Lydia.**—On Tuesday, March 26th, Messrs. Richardson, Duck & Co. launched from their building yard a steel screw steamer of the following dimensions:—Length, over all, 800 ft.; breadth, extreme, 42 ft.; depth, moulded, 27 ft. 6 in.; tonnage gross, about 2,740 tons. The vessel has been built under special survey and will take Lloyd's 100 A1 class. She is of the complete awning-deck type with a large deckhouse forward of engine casing, in which accommodation is provided for 24 passengers, an upper house being fitted for smoke-room, chart-room, &c. The officers and engineers are berthed in a deckhouse aft of the engine skylight. The vessel has a cellular double-bottom all fore and aft, which, together with the after peak, is arranged for water ballast. She will be schooner rigged, and her equipment includes four large steam winches, steam steering gear, stockless anchors, direct steam windlass, and all the latest appliances to facilitate loading, discharging and manœuvring. Her engines are by Messrs. Blair & Co., Limited, of Stockton; cylinders 22 in., 36 in. and 59 in., by 39 in. stroke, with two single-ended boilers, 18 ft. 9 in. diameter by 10 ft. long, working pressure, 160 lbs. The vessel has been built to the order of Messrs. A. C. de Freitas & Co., of Hamburg, for their South Brazil trade. As she left the ways she was christened *Lydia* by Miss Gillet, of Warminster, Wilts.

**Arkadia.**—On March 26th there was launched from the Thornaby Shipbuilding Yard of Messrs. Craig, Taylor & Co., a steel screw steamer for Messrs. A. C. de Freitas & Co., for their Hamburg and South Brazilian trade. This is the fourth vessel owned by this firm, which Messrs. Craig, Taylor & Co. have built. The dimensions are:—238 ft. by 41 ft. by 24 ft. 7½ in.; built on the awning deck rule, and similar in this respect to two vessels which have preceded her, viz., the *Macedonia* and *Ithaka*. She is, however, fitted up with very sumptuous passenger accommodation suitable for a hot country, for over 40 first-class passengers. The saloon will be charmingly fitted up with dining alcoves, swing chairs, sideboards, &c., and upholstered in a superior manner, while the sleeping accommodation is apart from the saloon, and in separate state-rooms, each having two berths, with bathroom and lavatory accommodation for both ladies and gentlemen. There is also a ladies' boudoir, or retiring room, and a smoke-room fitted up in a most comfortable manner. The accommodation for the captain, engineers and officers, is all carefully arranged for the special trade, affording both plenty of room and abundant ventilation. The galley, which is a specially large one, is fitted with very superior Hamburg cooking range. The vessel also has an ice-house, mail and bullion room, and capital bathroom for the firemen and crew; the object of the owners being to have thoroughly comfortable quarters for all on board, the sanitary conditions receiving particular attention, as the work of the vessel will be a good deal on the Brazilian coast, which does not boast of the highest reputation from a health point of view. The vessel will be fitted with propelling machinery by Messrs. Blair & Co., Limited, the cylinders being 21 in., 35 in., and 57 in., by 39 in. stroke, calculated to give a speed of between 11 and 12 knots. She is also fitted with steam steering gear by Messrs. Davis & Co., of London; patent steam windlass by Messrs. Emerson, Walker & Thompson Bros., Limited; steam winches by Messrs. R. Roger & Co.; Hastie's screw gear; and she has a large, separate, multitubular donkey boiler, by Messrs. Riley Bros., for supplying the steam for this deck machinery. She

will carry a large deadweight on a light draft, viz., about 2,500 tons on 16 ft., which renders her particularly suitable for some of the shallow ports on the Brazilian coast. The vessel has been built to the highest class in Bureau Veritas, and also under the superintendence of Mr. Heintz Wiengreen and Mr. C. Hanven, the representatives of the owners. The ceremony of christening the vessel the *Arkadia* was very gracefully performed by Mrs. Fawcett, wife of Dr. Fawcett, Thornaby.

**Romsdalen.**—On Thursday, March 28th, Messrs. William Gray & Co., Limited, launched a fine steel screw steamer which they have built to the order of Messrs. Erickson, Harland & Willis, of West Hartlepool. The vessel will take Lloyd's highest class, and her dimensions are:—Length over all, 310 ft.; breadth, 40 ft.; and depth, 20 ft. 10 in. She is of the partial awning type with poop, and raised quarter deck. The saloon and cabins will be tastefully fitted in the poop, the engineers' rooms amidships and the crew's accommodation forward. The hull is built with web frames, and a cellular double bottom for water ballast, and the after peak is also constructed as a ballast tank. The steam winches, steam steering gear amidships, screw gear aft, two donkey boilers, patent direct steam windlass, stockless anchors stowing into hawse pipes, &c., will all be of the best description, and shifting boards, as required by the grain carrying Acts will be fitted. Boats on beams overhead, two masts telescoping to clear bridges, with schooner rig and all modern appliances will be fitted to thoroughly equip the vessel for general trading. The Central Marine Engine Works of Messrs. W. Gray & Co., Limited, supply fine triple-expansion engines having cylinders 22 in., 35 in., and 59 in. diameter, with a 39 in. piston stroke, and two large steel boilers to work at 160 lbs. pressure per square inch, with evaporator and all latest improvements. The vessel and machinery have been superintended during construction by Captain T. W. Willis and Mr. C. Dobson on behalf of the owners. The ceremony of naming the ship *Romsdalen* was gracefully performed by Mrs. Hans Erickson, wife of one of the owners.

**Trevethoe.**—On March 28th there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, West Docks, South Shields, a new steel screw steamer of the following dimensions, namely:—Length, 284 ft.; breadth, 39 ft.; depth, moulded, 19 ft. 0½ in. The vessel is intended for general trade, is of the partial awning deck type, and is fitted with all the latest improvements for rapid loading and discharging of cargo. Her engines, also built by Messrs. John Readhead & Sons, are of the triple-expansion type, having cylinders of 20½ in., 33½ in., and 55 in. diameter, and 36 in. stroke, steam being supplied from two large steel boilers, working at a pressure of 160 lbs. per square inch. The steamer has been built for Messrs. Edward Hain & Sons, St. Ives, Cornwall, and is the 28th vessel built by Messrs. John Readhead & Sons for the same owners. She is named the *Trevethoe*.

**Orentes.**—On Thursday, March 28th, Messrs. Cochrane & Cooper launched, from their yard at Grovehill, a handsomely modelled iron steam line fishing vessel and trawler, classed 100 A1 at Lloyd's, which has been built to the order of Messrs. Thomas Hamlyn & Co., Limited, Hull, and is the first of the kind out of the port, being fitted with Alwads & Charleston's patent well and pumping arrangement, by means of which the water can be circulated in the well every 45 minutes. The vessel will be the largest and most powerful in the district. Her dimensions are as follows:—118 ft. over all, 21 ft. broad, and 11½ ft. depth of hold, with 60 N.H.P. triple-expansion engines, by Messrs. C. D. Holmes, Hull, having cylinders 13 in., 21 in., 34 in., by 24 in. stroke. She will also have a large steel boiler, working at 170 lbs. pressure. On leaving the ways the vessel was named the *Orentes*, by Miss Lizzie Fisher, of Beverley Parks.

**George William.**—On March 30th an English oak keel, to carry 120 tons, for the corn trade, was launched by Mr. Henry Connell, at Selby. The vessel was christened the *George William* by the son of the owner, Mr. John Jackson, of Cawood. The dimensions of the vessel, which is intended to ply between York and Hull, are 67 ft. over all, the depth of the boat amidships being 7 ft. 4 in.

**Achilles.**—On April 4th Messrs. Fellows launched at Yarmouth a steel barge of 100 tons capacity, named the *Achilles*. This vessel has been built for Messrs. Keen, of London, and is intended for the grain traffic on the London river.

**Tiger.**—On April 9th Messrs. Ropner & Son, of Stockton, launched a steel screw steamer of the following dimensions:—Length, between perpendiculars, 324 ft.; breadth, 46 ft. 6 in.; depth, 27 ft., which they have built for a Continental firm. The steamer is built off the spar-decked rule, having poop, bridge and topgallant forecastle, her deadweight carrying capacity being 5,000 tons on 21 ft. The saloon and cabins for the captain and officers are fitted in the poop, whilst the engineers are accommodated under the bridge amidships, and the crew in the topgallant forecastle. She has water ballast in a cellular bottom and in the after peak; all labour-saving appliances are fitted for economical working, and also for the expeditious loading and unloading of cargoes; she has steam steering-gear amidships and screw-gear aft, four powerful steam winches, one large multitubular donkey boiler, direct steam windlass, stockless anchors, &c. The engines will work up to about 1,100 effective H.P., and are by Messrs. Blair & Co., Limited. They are of the triple-expansion type, having cylinders 23½ in., 39 in. and 64 in. by 42 in., steam being supplied by two large steel boilers working at 160 lbs. pressure. The steamer has been built under the supervision of Mr. C. A. Bushell, of Newcastle-on-Tyne; and was christened *Tiger* by Miss Corder, of the same city.

**Harlington.**—On April 9th Messrs. S. P. Austin & Son launched from the Wear Dockyard the steel screw steamer *Harlington*, built to the order of a London firm of shipowners and coal merchants. The dimensions are as follows:—Length, 220 ft.; breadth, 31 ft. 6 in.; depth, 16 ft. 2 in., moulded; gross tonnage about 1,080 tons. Her machinery will be supplied by Messrs. William Allan & Co. The vessel has been constructed under special survey at Lloyd's to class 100 A1.

**H.M.S. Lightning.**—H.M. torpedo-boat destroyer *Lightning* was launched on April 10th from the Jarrow Yard of Messrs. Palmer's Shipbuilding and Iron Co., Limited. The vessel has been built to a model and design supplied by the builders, and is the second of three of the same class being built at Jarrow for the British Navy. Her dimensions are:—Length, 200 ft.; breadth, 19 ft. 9 in.; and about 280 tons displacement. Her armament consists of one 12-pounder quick-firing gun forward on the conning-tower, four 6-pounder ditto on the broadside, and one 6-pounder on a platform aft. There are also two revolving torpedo tubes on deck arranged to fire on either broadside. She also has a powerful electric search light. The officers and engineers' cabins are arranged abaft of the engine-room, and forward there is accommodation for about 40 men. The builders have guaranteed a speed of 27 knots per hour, and the machinery, which has also been designed by them, consists of two sets of triple-expansion engines, in one compartment, of a special design to suit the high rate of speed. Steam is supplied by four of Reed's patent water-tube boilers, constructed by the builders, fitted in two separate water-tight compartments with the necessary fans for supplying air under forced draught. The christening ceremony was performed by Mrs. Dillon, wife of Mr. M. Dillon, secretary of the Palmer Co., after which the visitors adjourned to the model-room of the company where they partook of refreshments. Colonel English, the general manager, proposed success to H.M.S. *Lightning*, and the toast being enthusiastically drunk, the proceedings terminated.

**Afridi.**—On Wednesday, April 10th, Sir Raylton Dixon & Co., Middlesbrough, launched from Cleveland Dockyard a very handsome steel screw steamer of about 5,500 tons deadweight carrying capacity, built to the order of the Mogul Steamship Co., of which Messrs. Gellatly, Hankey, Sewell & Co., of London, are managers, and intended for the China tea trade. The vessel will take Lloyd's highest class and has been built under special survey to their three-decked rule. Her dimensions are 372 ft. by 45 ft. 6 in. by 28 ft. 4 in. The upper decks are all of teak and the vessel is specially fitted in every way for the Eastern trade. The accommodation is all arranged on the upper deck with a charthouse and captain's room on bridge deck, and the crew in topgallant forecastle. The vessel will be fitted with six steam winches, powerful steam steering gear amidships, and every modern appliance, including Sidgwick's patent hinged topmast. Triple-expansion engines will be fitted by Messrs. The Wallsend Slipway and Engineering Co., Limited, of Newcastle-on-Tyne, with cylinders, 27 in., 44 in. and 72 in. by 48 in. stroke, provided with steam by two single-ended boilers, 15 ft. by 11 ft. 8 in., working at 170 lbs. pressure, and fitted with Howden's system of forced draft. The vessel is built on fine lines and handsome model, so as to attain a good rate of speed. The hull and machinery have been constructed

under the supervision of Mr. F. Edwards, 62, Bishopsgate Street Within, London, the owners' consulting engineer. The christening ceremony was gracefully performed by Mrs. Walter W. Kennedy, of Redcar, who named the vessel *Afridi*.

**Arion.**—On Wednesday, April 10th, Messrs. Furness, Withy & Co., Limited, launched from their shipbuilding works at Hartlepool, a large steel screw steamer built to the order of Messrs. Rickinson, Son & Co., West Hartlepool. The vessel is a substantial type of a modern cargo boat measuring over 320 ft. in length and built throughout of Siemen's Martin steel, with a large measurement and deadweight capacity, and is built to the highest class at Lloyd's. Every care has been taken in designing this ship to construct her as strong as possible for the heavy deadweight trade. The vessel is built on the web frame system, with cellular double bottom, all fore and aft, and subdivided at intervals, the after peak being also available as a tank. The main and fore holds are divided by iron watertight bulkheads efficiently stiffened by an iron longitudinal division. The greater portion of the shell plating is in 24 ft. lengths, and is efficiently backed up by strong sectional framing to the top of the vessel all fore and aft, the topside plating being extra thick to withstand the heavy Atlantic trade. The bottom plating is also thicker in way of the ballast tanks to allow of the vessel lying aground whilst loading. The whole of the weather decks, tank top, floor plates, &c., are also of extra thickness, and the hatchways are of extra size to take in the bulkiest cargo. Large winches to hatches, patent steam steering gear amidships with hand gear aft, steam windlass, large donkey boiler, and patent stockless anchors are fitted. The vessel will be rigged as a pole-masted schooner, and to make her available for bridge and canal work, the topmasts are telescopic. The engines and boilers have been constructed by the Central Marine Engine Works, West Hartlepool, and are of massive design with every provision for economical working. The ship and engines have been constructed under the supervision of Mr. C. E. Smith, on behalf of the owners. On leaving the ways the vessel was gracefully christened *Arion* by Miss Rickinson.

**Salvador Correia.**—On April 11th the *Salvador Correia*, a steel despatch vessel built by Messrs. Laird Bros. for the Portuguese Government, was launched at Birkenhead. The vessel has been designed to meet the requirements of the Portuguese Colonial service on the African coast. She is about 300 tons B.M., and has engines of 480 I.H.P.

**Jupiter.**—On April 11th Messrs. Osbourne, Graham & Co. launched at Hylton a screw steamer to the order of Mr. John Lookie, of Newcastle, of the following dimensions and particulars:—Length, 335 ft. by 43 ft. beam, and 29 ft. 3 in. depth moulded to the spar deck. The vessel is built with cellular bottom fore and aft, and with poop, bridge, and forecastle. Captain and officers are to be berthed in house amidships, leaving the poop for cargo or to be fitted up for passengers as occasion may require. She will have five steam winches by Wigham, and a patent "Tyne" donkey boiler by Clarke, Chapman & Co., Limited; double derricks, and all appliances and fittings that will conduce to economy and rapidity in loading and discharging. The engines are by George Clark, Limited, of good power, 24½ in., 40 in., and 66 in. cylinders, by 45 in. stroke, with two large boilers, calculated to drive the boat at a high rate of speed. On leaving the ways the ceremony of naming the vessel the *Jupiter* was performed by Mrs. Lookie, of Newcastle-on-Tyne.

**Turret Cape.**—On April 23rd this turret-deck steamer was launched from the yard of Messrs. William Doxford & Sons, Limited, of Sunderland, having been built to order of Messrs. Petersen, Tate & Co., Newcastle. She will receive the highest class in both the British Corporation and Bureau Veritas.

**Elfie.**—On Wednesday, 24th April, Messrs. Wm. Gray & Co., Limited, launched the fine steel screw steamer *Elfie*. She is of the following dimensions, viz.:—Length, over all, 280 ft.; breadth, 37 ft.; depth, 19 ft. 6 in., and has been built to the order of Messrs. C. Nielsen & Son, of West Hartlepool, and will take Lloyd's highest class. The deck erections consist of poop, raised quarter deck, long bridge and topgallant forecastle. A tasteful saloon, state-room, and accommodation for captain and officers will be fitted up in the poop, and comfortable quarters for the engineers at after end of the bridge, and for the crews in the forecastle. The vessel is built on the web frame system and cellular double bottom for water ballast, and there is also a large ballast tank in the after peak. Four steam winches, donkey boiler, steam steering gear amidships, screw steering



gear aft, patent windlass, schooner rig, boats on beams overhead, and all modern appliances will be fitted. The engines are of the triple-expansion type, working on three cranks. They are supplied by the Central Marine Engine Works of Messrs. William Gray & Co., Limited. The cylinders are 19 in., 30½ in., and 51 in. diameter, and the piston stroke 86 in. The boilers, built of steel, are of large size, and will give an ample supply of steam at a working pressure of 160 lbs. per square inch. The ceremony of naming the *Effie* was gracefully performed by Miss Fernandes, of Ackworth House, Yorkshire.

#### LAUNCHES.—SCOTCH.

**Effort and Empress.**—On March 26th Messrs. Mackie & Thomson launched from their yard, at Govan, two steel screw "floaters" for the Great Northern Steam Fishing Co., Limited, Hull. They are twin vessels, the dimensions of each being:—Length, 103 ft. 9 in.; breadth, 20 ft. 6 in.; moulded depth, 11 ft. 7 in. The engines, which have been built by Messrs. Muir & Houston, Kinning Park, have a gross tonnage of 160 tons each, and are triple-expansion. The vessels are named the *Effort* and the *Empress* by Miss Ruby Raeside, of Craiglea, Dennistoun, and Miss Cassie Raeside respectively.

**Twin-Screw Hopper Dredger.**—On March 26th Messrs. Wm. Simons & Co., Renfrew, launched from their yard, complete with its dredging and propelling machinery on board, a powerful stern-well twin-screw hopper dredger. It is a duplicate of two dredgers they constructed last year for the British Admiralty, and will, like them, be employed in connection with the extensive dredging operations at Her Majesty's Dockyard, Portsmouth. It is specially designed to raise and discharge adhesive clay. The hoppers have a capacity for 650 tons of material, and the buckets work at a maximum depth of 46 ft. under water level.

**Zara.**—On March 27th the Ailsa Shipbuilding Co. launched from their yard at Troon, on the Ayrshire coast, a handsomely-modelled yacht for Mr. Peter Coats, of Paisley. The following are her dimensions:—Length over all, 201 ft., length on load water line, 165 ft.; breadth, moulded, 25 ft.; depth, moulded, 16 ft. 6 in. She was built under a shed specially erected for the purpose, and will be fitted throughout in the most sumptuous manner, including a complete installation of electric light. Her engines, which are triple-expansion, are being fitted by Messrs. David Rowan & Son, Glasgow, and are designed to give a high speed. She is designed by Mr. G. L. Watson, who superintended her during construction. On leaving the ways she was christened the *Zara* by Miss May Mackenzie Coats, Stanley, Paisley. After the launch, Mr. Coats and a number of friends adjourned to the drawing office, when the usual toasts were given.

**Greta.**—On March 27th Messrs. Scott & Co., shipbuilders, Greenock, launched a handsome steam yacht of about 350 tons, built for the senior partner of the firm—Mr. John Scott, C.B. On leaving the ways she was named *Greta*.

**Hart.**—On March 27th the Fairfield Shipbuilding and Engineering Co., Limited, Govan, launched the second of the three torpedo-boat destroyers which they are constructing for the British Government. The vessel, which is named the *Hart*, is 200 ft. long, and 19½ ft. broad, while the displacement when equipped for sea will be about 300 tons, and the draught 5½ ft. She is fitted with twin screws, her engines indicating between 3,600 and 4,000 H. P., the *Hart*, like all the other vessels of her class, is to have a guaranteed speed of 27 knots, or 31 miles, per hour. There are no deck erections excepting guns, funnels, and conning tower. The last mentioned is situated aft of the forward turtle-back, and from it the ship is navigated. On either side the protection afforded by the turtle-back is to be utilised for mounting three six-pounder guns, besides a 12-pounder, while two torpedo-discharging guns will be placed on deck. The *Hunter*, which is the last of the three torpedo catchers at Fairfield, will be ready for launching in the course of a few weeks.

**Wicklow.**—On March 28th Messrs. Blackwood & Gordon, shipbuilders and engineers, Port-Glasgow, launched at high water the steel screw steamer *Wicklow*, built to the order of the City of Dublin Steam Packet Co., for their cross-channel traffic between Dublin and Liverpool. Her dimensions are: Length, 260 ft.; breadth, 34 ft.; depth, 16 ft. 9 in.; and of 1,250 tons gross register. The vessel will be handsomely fitted

throughout, with a luxuriantly-furnished saloon capable of accommodating 70 first-class passengers. Triple-expansion engines of 2,750 indicated horse-power will be supplied by the builders. Special attention has been devoted to the facilities for the conveyance of live-stock. Five hundred head of cattle can be carried, and the space allotted for this purpose is large and well ventilated. Forward in the steamer are a cattle dealers' cabin and comfortable accommodation for deck passengers. As the vessel left the ways she was gracefully named by Mrs. Bell, wife of Captain G. R. Bell, R.N., Liverpool agent of the company. There were also present at the launch:—Mr. Edward Watson, managing director of the company; Mr. E. G. Ferber, superintending engineer of the company; Mr. and Mrs. Walter Blackwood, Mr. and Mrs. D. B. M'Geoch, Mr. and Mrs. W. Carlisle Wallace, Mr. John Anderson, Mrs. Purvis, the Misses Harrington, Miss Gordon, Mrs. King, Port-Glasgow; Messrs. James Struthers, William Merri-tees, David Pollock, Glasgow; and Mr. Spencer, Greenock. After the luncheon, which took place in the builders' model-room, Mr. M'Geoch proposed "Success to the *Wicklow*." He believed she would prove as successful as the *Louth*, which they had built for the same owners, and of which she is a duplicate. The *Louth* had been running for six months, and the report they had of her from the owners was that she had proved very satisfactory, and from outside quarters that she is the finest Channel steamer crossing, and that she gives satisfaction to the cattle dealers. The City of Dublin Steam Packet Co. is an old shipping company—he supposed, the oldest in Ireland. They had had the pleasure and the privilege of carrying the mails between England and Ireland for many years, and he hoped they would get the new contract, which had yet to be fixed. Mr. Watson, in reply, and in proposing "The health of the builders," said he believed the *Wicklow* would prove the greatest possible assistance in the carrying on of their business. He had a personal knowledge of the traffic during the past twenty years, and the weather of the past winter had been abnormally bad. During the night of the great storm, on the 21st December, he took a passage in the *Louth*, the steamer last built for them by Messrs. Blackwood & Gordon, and she proved to be a vessel that could carry a large cargo and go as well on a rough day as on a fine day. The only vessel that got into Dublin in reasonable time that morning was the *Louth*. Her performances had given such satisfaction that they were enabled to satisfy their colleagues that a new vessel was necessary. The result was they were there that day witnessing the launch of the *Wicklow*, and if she proved as successful as the *Louth* he thought they would feel satisfied. Mr. M'Geoch replied on behalf of his firm, and several other toasts were proposed and duly acknowledged.

**Keong Wai.**—On March 28th there was launched from the yard of the Fairfield Shipbuilding and Engineering Co., Limited, the steel screw steamship *Keong Wai*, for the Scottish Oriental Steamship Co., Limited. The dimensions of the vessel are:—Length, 290 ft.; breadth, 38 ft.; depth, 22 ft. 9 in.; and gross tonnage about 1,850. This is the eleventh vessel built at Fairfield for the Scottish Oriental Co., and is somewhat larger than their present steamers. She is classed in the highest grades in the Bureau Veritas Registry, and also in the British Corporation, and is under the Board of Trade survey. The *Keong Wai* has a cellular double bottom for water ballast, topgallant fore-castle, bridge with chart-house above, deckhouse aft, turtle-back stern, two pole masts, and schooner rigged. The first-class passengers and captain's accommodation is situated in the after deckhouse, with a comfortable saloon and all conveniences. The officers and engineers' cabins are placed under the bridge deck, and the crew and firemen are berthed forward. The 'tween deck spaces are fitted with sidelights, and all arrangements made for carrying Chinese passengers, and the full complement of boats and life-saving appliances are provided as usual. A donkey boiler and deck machinery, including steam cargo winches, steam steering gear, and steam capstan windlass, are supplied complete. The vessel will be fitted with surface-condensing triple-expansion engines, having three inverted cylinders 22 in., 38 in., and 57 in., diameter, all adapted for a stroke of 3 ft. 6 in. The high-pressure cylinder is fitted with a piston valve, the intermediate and low-pressure cylinders are fitted with slide valves, all worked by the usual double eccentric link motion valve gear, and controlled by steam-reversing gear. The crank shaft is "built," and together with the tunnel and propeller shafts is of mild steel; the propeller blades are of manganese bronze. Steam will be supplied



by two single-ended boilers made entirely of steel, each having three corrugated furnaces, and adapted to work at 140 lbs. pressure per square inch. The machinery will be fitted with all the modern improvements for economical working, including feed-water heater, evaporator, and feed-water filter, and all the necessary auxiliaries. The vessel on leaving the ways was christened *Koong Wai*, by Mrs. Cockburn, of Edinburgh.

**Fervent.**—On March 28th Messrs. Hanna, Donald & Wilson, Paisley, launched from their Abercorn shipbuilding yard the first of two torpedo-boat destroyers for Her Majesty's Government. A number of officials from the Admiralty witnessed the proceedings. The vessel is 200 ft. long by 19 ft. beam, having a displacement of about 280 tons. She is fitted with two sets of triple-expansion surface-condensing engines, having a collective H.P. of about 4,000 indicated. The boilers are of the usual locomotive type, and are fitted in two separate watertight compartments with the necessary fans for supplying an under-forced draught. Her armament will consist of one 12-pounder quick-firing gun on conning tower, four 9-pounder quick-firing guns on the broadside, one 6-pounder quick-firing gun on a pedestal aft. There are also two single revolving torpedo tubes on deck, and she is to have powerful electric searchlight. The officers and engineers' cabins are situated abaft the engine-room, and the crew's accommodation forward. Mrs. Harding cut the line and launched the vessel, and Mrs. Knapman named it the *Fervent*.

**Axyphon.**—On March 28th there was launched by Messrs. Cumming & Ellis, at Inverkeithing, a steel screw steamer, 136 ft. by 23 ft. by 10 ft. 4 in., built to the order of Captain Spero, Vlassopoulos, Piræus. This vessel is intended for trading among the Grecian Islands, and was towed to Leith, where the machinery will be shipped by Messrs. Hawthorne & Co.

**Cambusdoon.**—On March 29th there was launched from Messrs. Russell & Co.'s yard, Port-Glasgow, a steel sailing vessel of about 1,580 tons net register, built to the order of Messrs. Robert Russell & Co., Gordon Street, Glasgow. The vessel is for the general carrying trade, and has been built under the superintendence of Mr. Hugh Stewart, and is to be commanded by Captain Macdonald. On leaving the ways she was named *Cambusdoon* by Miss Madge Russell, Sardinia Terrace, Glasgow.

**Menes.**—On March 30th Messrs. R. Napier & Sons launched at Govan a steel screw steamer of about 2,500 tons, for the Moss Steamship Co., Liverpool. This new steamer is a duplicate of the steamer *Ramesses*, recently built by Messrs. Napier for the company's Mediterranean service, and has been constructed under special survey to class 100 A1 Lloyd's three-deck rule on the deep-frame principle. The general dimensions of the vessel are:—Length, 320 ft.; breadth, moulded, 38 ft.; and depth, moulded, 24 ft. 7 in., with a topgallant fore-castle, long bridge-house, and full poop; and while designed to carry a large cargo, superior accommodation has also been provided in the fore-part of the bridge-house for first-class passengers. This accommodation includes a handsome dining saloon on the upper deck, finished in polished hardwood; the state-rooms are very large and roomy, and are fitted with the most modern appliances for the comfort of the passengers, while above, on the bridge deck, are commodious music and smoking rooms, and in the poop scarcely inferior accommodation for the second-class passengers. All the most modern appliances have been supplied for the working of the ship and the rapid handling of cargo, and a very complete installation of electric lighting has been fitted throughout the vessel. The machinery consists of a set of triple-expansion engines, and two single-ended boilers for a working pressure of 200 lbs., with the most recent improvements for efficiency and economy. The ship and engines have been constructed under the superintendence of Messrs. William Esplen & Sons, of Liverpool. Miss Millicent H. Moss named the vessel the *Menes*. After a most successful launch, the ship was towed up the harbour to receive her machinery, which has been constructed at the builders' Lancefield Works.

**Redgauntlet.**—On April 4th Messrs. Barclay, Curle & Co., Limited, launched from their building yard, Whiteinch, a smart steel paddle steamer, built to the order of the North British Steam Packet Co., which will be a handsome addition to their fine fleet of tourist steamers, and will enable the company successfully to cope with their large and ever-increasing passenger traffic between Craigendoran, intermediate ports, and Rothesay. The new boat will be a worthy consort of the famous *Jeanie Deans* (by the same builders), the premier steamer

of the company's fleet. The vessel is fitted with dining-room forward under deck, large and commodious saloon aft above deck, and smaller one forward for smoking-room. The promenade deck extends over the entire length of the afore-mentioned saloons. The furniture, fittings and upholstery will be supplied by Messrs. Wylie & Lochhead, and will be of the most luxurious and modern description. On leaving the ways the vessel was named the *Redgauntlet* by Mrs. William Russell Ferguson, of Lamorna, Scotsoun Hill, wife of Mr. William R. Ferguson, of Messrs. Barclay, Curle & Co., Limited, and was afterwards towed to the crane to be fitted with her machinery, which is being supplied by the builders.

**Paknam.**—On April 8th Messrs. R. Napier & Son launched at Govan a steel screw steamer of about 700 tons for the Compagnie Messageries Fluviales de Cochinchine. This is the third steamer which Messrs. Napier have recently built for the company. It has been constructed under special survey to the highest class at Bureau Veritas, and is fitted with teak decks and the latest improvements for efficiency and economy. The principal dimensions are:—Length, 210 ft.; breadth, 27 ft. 10 in.; depth, 14 ft. 9 in.; with a topgallant fore-castle, long bridge and full poop. As the vessel is intended for service in a hot climate, the passenger accommodation has been placed on the upper deck to admit of good ventilation, and includes very superior accommodation amidships for the first-class, with a handsome dining saloon in selected bird's-eye maple, and extra large state-rooms with polished mahogany fittings and the most modern appliances for the comfort of the passengers. A comfortable saloon and state-rooms for the second-class passengers has been provided in the poop, and the captain's and officers' cabins are in a teak house on the bridge deck. The machinery consists of a set of triple-expansion engines capable of indicating 600 H.P., with two single-ended boilers for a working pressure of 144 lbs. As the vessel commenced to move down the ways she was named the *Paknam* by Miss Agnes M. Hamilton, and after a successful launch the vessel was towed up the harbour to receive her machinery, which has been constructed at the builders' Lancefield Works.

**Diomed.**—On April 9th Messrs. Scott & Co. launched at Greenock the steel steamer *Diomed* for the Ocean Steamship Co., Liverpool. The *Diomed* is a sister ship to the *Orates* and the *Dardanus*, built and engined by Messrs. Scott & Co. for the same firm. She is a vessel of 4,384 tons gross, with a carrying capacity of 6,500 tons, and the builders will supply triple-expansion engines of 2,500 I.H.P.

**Glenmore.**—On April 9th Messrs. Russell & Co. launched from Kingston Yard, Port-Glasgow, a steel paddle saloon steamer to the order of Captain John Williamson. The dimensions are:—Length, 190 ft.; breadth, 21 ft.; depth, 7½ ft. Messrs. Rankin & Blackmore, Greenock, will supply compound surface-condensing engines and a locomotive boiler. The ceremony of naming the vessel *Glenmore* was gracefully performed by Miss Williamson, Rothesay. A speed of 14 knots an hour is expected, and according to present arrangements the steamer, which is intended for passenger traffic on the Clyde, will commence sailing on 15th May.

**Glencloy.**—On April 10th what is said to be the first steam vessel ever built in Arran was launched at Brodick. Although a number of small sailing vessels, ranging from 80 to 60 tons, have been constructed there, none of them approached the size of the one launched. The vessel is constructed of wood, the greater part of which was grown on the island. The owner, Mr. Adam Hamilton, is the designer as well as the builder. The following are the ship's dimensions:—Length of keel, 60 ft.; length over all, 68 ft.; breadth of beam, 18 ft.; depth, moulded, 7 ft. She is to be supplied with a steel boiler, and compound surface-condensing engines of about 80 H.P. by Shanks & Son, Arbroath. The vessel was named *Glencloy*.

**Cambria.**—On April 10th there was launched by Messrs. H. M'Intyre & Co., at Alloa, a passenger steamer, named the *Cambria*, built for Messrs. Peter & Alex. Campbell, of Bristol. The new steamer is 238 ft. in length over all, 17 ft. in depth, and has a beam of 26 ft., giving a fine promenade deck which is carried right up to the stem, similar to that of the paddle steamer *Westward Ho*, of which vessel the paddle steamer *Cambria* is an exact duplicate in her external appearance. The machinery will consist of a pair of compound engines of about 2,600 I.H.P., with 37½-in. and 67-in. cylinders of 60-in. stroke.

**Vladimir.**—On April 11th there was launched from the shipbuilding yard of Messrs. Wm. Denny & Bros., Dumbarton, the

steel screw steamship *Vladimir*, which is of the following dimensions and tonnage:—Length, 419 ft.; breadth, 49 ft. 6 in.; depth, 32 ft.; and tonnage, 5,400 tons gross. The ship has been constructed for the Russian Volunteer Fleet, for the conveyance of passengers and cargo, and is considerably larger than the *Yaroslave* and *Tamboff*, built for the same company a couple of years ago. The machinery will be supplied by Messrs. Denny & Co. The ceremony of naming the vessel was performed by Miss Kitty Denny, Tunstan, daughter of Mr. James Denny, Dumbarton.

**Sakiz.**—On April 11th there was launched by Messrs. John Fullerton & Co., Paisley, the second of three steel screw steamers of about 200 tons each, which they are building to the order of Messrs. Thomson & Campbell, London, for a foreign government. The steamer has been specially designed as a revenue cruiser, commodious accommodation being fitted for officers and crew. Powerful electric searchlight is fitted on bridge, look-out cage on foremast. Steam windlass, steam-steering gear by Reid, of Paisley, along with other specialities. Compound engines of great power are being supplied by Messrs. Ross & Duncan, Govan, for high speed. The steamer has been inspected during construction by Capt. David Kyle, and was named *Sakiz*, by Miss Lamb, 3, Albion Place, Downhill, Glasgow.

**Bengloe.**—On April 11th there was launched from the building yard of Messrs. Barclay, Curle & Co., Limited, Whiteinch, Glasgow, a steel screw steamship, built to the order of Messrs. William Thomson & Co., of Leith—this being the sixth steamer constructed by the builders for the same owners—and is intended for their general Eastern trade, being specially designed for tea cargoes, and fitted with ample and suitable accommodation for the carriage of Chinese emigrants. The vessel has a very smart appearance, having a clipper stem, and carved figurehead, the same as all the other Bens, instead of the usual straight stem, and will be rigged as a schooner. She has been built to Lloyd's highest class, and under special survey, and will be furnished with Board of Trade passenger certificate. While under construction the ship and machinery were under the superintendence of Captain Potter, the company's superintendent, and Mr. Buchanan, engineer. Her dimensions are:—330 ft. by 41 ft. 9 in. by 27 ft., and measures about 3,000 tons gross. The vessel was named the *Bengloe* by Miss Louise Thomson, daughter of Mr. James W. Thomson, of Glen Park, Mid-Lothian, and after the launch was towed to the harbour to be fitted with her machinery, which is being supplied by the builders.

**Cervantes.**—On April 11th Messrs. David and William Henderson & Co., launched at Partick the *Cervantes*, a steel screw steamer, which they have built for Messrs. Lamport & Holt, of Liverpool. This vessel is a duplicate of the *Canova*, recently built by Messrs. Henderson for the same owners, the dimensions being:—Length, 410 ft.; breadth, 48 ft.; depth, 29 ft. 2 in.; and the gross tonnage about 4,650. The vessel is a fine example of a first-class modern cargo carrier, combining large deadweight capacity with considerable speed. The cargo working arrangements are most complete, and include nine steam winches. Water ballast is carried in a cellular double bottom, the peaks, and a hold tank, amounting in all to over 1,500 tons. The erections consist of poop, bridge, and fore-castle. Under the poop are the parcel-room, store-rooms, &c. The bridge covers cattlemen's, petty officers', apprentices', and stewards' accommodation, bakery, and store-rooms. The officers' and engineers' rooms and mess-room are on the top of the bridge deck in houses alongside the engine casing. The saloon, captain's room, and state-rooms for a few passengers are in a deck-house at the fore end of the bridge deck. The saloon is handsomely finished in polished hardwood. A teak chart and wheel-house is fitted on the cabin deck-house with Lord Kelvin's standard compass on the top. The rooms are lighted by electricity, including cargo lamps for the hatches. The seamen and firemen are berthed in the topgallant fore-castle. The vessel will be rigged as a two-masted schooner, the masts being telescopic to suit the Manchester Canal. The machinery has been constructed by the builders, and consists of a set of triple-expansion engines, with cylinders 27 in. 46 in. and 76 in. in diameter by 60 in. stroke, and three large double-ended boilers, with a working pressure of 180 lbs. The ship and machinery take Lloyd's highest class, and during construction have been under the inspection, on behalf of the owners, of Mr. John Russell for the hull, and Mr. Morrin for the machinery.

**Bishop Rock.**—On April 13th the Ailsa Shipbuilding Co. launched a steel screw steamer, 170 ft. by 25 ft. 9 in. by 12 ft. 10 in. moulded, for Messrs. Alfred Rowland & Co., of Liverpool, for their Rock Line of Channel traders. She will be classed 100 A1 at Lloyd's under special survey, and fitted with compound engines, 21 in. and 42 in. cylinders by 30 in. stroke, by Messrs. Muir & Houston. This is the third vessel built by the Ailsa Shipbuilding Co. for Messrs. Rowland & Co., and they have a sister ship to this one on the stocks to be launched shortly. The christening ceremony was gracefully performed by Mrs. Rowland—the name given being *Bishop Rock*.

**Thetis.**—On April 13th Messrs. Scott & Son launched from their shipbuilding yard at Bowling a screw steamer of dimensions 140 ft. by 24 ft. by 11 ft. 2 in., built to the order of Messrs. Robert Walker & Co., Clyde Terrace, Glasgow, for their fish-carrying trade. Triple-expansion engines of large power will be fitted on board by Messrs. Ross & Duncan, Govan, and the boilers by Messrs. Anderson & Lyall, Govan, are of their patent combined fire and water-tube type. The construction of the steamer and machinery has been superintended by Mr. Anderson, of Messrs. Anderson & Lyall. On moving down the ways the steamer was named *Thetis* by Miss Gibb, 10, Granby Terrace, Hillhead, Glasgow.

**W. A. Mackie and Empire.**—On April 16th Messrs. Mackie & Thomson, Govan, launched the *W. A. Mackie* and the *Empire*, two steam trawlers of about 160 tons, built respectively for Messrs. J. Leyman & Co., Limited, and the Great Northern Steamship Co., Limited, Hull. The boats are each 108 ft. 8 in. long, 20 ft. 6 in. broad, and 11 ft. 7 in. deep, and will be fitted with triple-expansion engines constructed by Messrs. Muir & Houston, Kinning Park. The *W. A. Mackie* was christened by Mrs. Mackie, Falkland Bank, Partick, and the *Empire* by Miss Wyle, Elmalie, Baillieston.

**Duchess of Rothesay.**—On April 20th there was launched from the yard of Messrs. James and George Thomson, Limited, Clydebank, a handsome saloon passenger steamer for the coast service of the Caledonian Steam Packet Co., Limited. The vessel was named the *Duchess of Rothesay*. She will be fitted up with all the latest improvements, including electric light, and when finished should prove a valuable addition to the fleet of the Caledonian Co. Captain James Williamson superintended the construction of the vessel on behalf of the owners.

**Girnigoe.**—On April 22nd Messrs. S. M'Knight & Co. launched from their shipbuilding yard at Ayr the steel screw steamer *Girnigoe*, built to the order of the John o'Groat Steam Shipping Co., Limited (Messrs. Duncan & Jamieson, managing owners), Wick, to be employed in the fish-carrying and general coasting trade. Her dimensions are:—Length, between perpendiculars, 140 ft.; breadth, moulded, 22 ft.; depth, moulded, 10 ft. 6 in.; built under special survey to class 100 A1 at Lloyd's. She has a long raised quarterdeck, bridge, and topgallant fore-castle. The machinery is being supplied by Muir & Houston, Glasgow. Engines, compound surface-condensing; cylinders 20 in. and 40 in. diameter, by 27 in. stroke; multitubular boiler, 12 ft. 6 in. diameter by 10 ft. long, 110 lbs. working pressure. The ceremony of naming the vessel the *Girnigoe* was performed by Miss Nicholson, Gowan Bank, Ayr.

**Caroni.**—On April 22nd Messrs. Fleming & Ferguson, ship-builders and engineers, Paisley, launched a steel screw tug steamer, built to the order of the Crown Agents for the Colonies for the Port of Spain, Trinidad. She has been built to Lloyd's requirements under the direction of Messrs. Coode, Son & Mathews, engineers, London, Mr. Wilson Wingate, of London, being inspecting engineer, and Mr. Robert Anderson, of Renfrew, resident inspector. As the vessel left the ways she was named the *Caroni* by Miss Wilson, 5, Meadowbank Crescent, Partick.

**Kashing.**—On April 22nd Messrs. Scott & Co., Greenock, launched a steel screw steamer named the *Kashing*, for the China Navigation Co., Limited, the fifth of an order for ten. Dimensions:—Length, 260 ft.; breadth, 38 ft.; depth, 22½ ft.; and with a carrying capacity of 2,400 tons. The builders will supply triple-expansion engines of 1,500 I.H.P.

**Steam Yacht.**—On April 23rd Messrs. Charles Connell & Co. Scotstoun Shipyard, launched a steam yacht which they have built to the order of Messrs. John & Arthur Connell. Her dimensions are 85 ft. by 15 ft. by 9 ft. moulded, and measuring 83 tons. Messrs. David Rowan & Son have supplied the machinery, consisting of a pair of compound engines, 9 in. and

18 in. cylinders by 12 in. stroke, with suitable boiler power. At the trial, which took place immediately after the launch, the very satisfactory speed of  $10\frac{1}{2}$  knots was got on the measured mile.

**Glenelvan.**—On April 24th Messrs. A. Rodger & Co., Port Glasgow, launched a three-masted sailing ship, which was gracefully named *Glenelvan* by Mrs. J. H. Hutchinson, wife of one of the partners of the firm. The vessel registers 1,850 tons, and is capable of carrying 3,200 tons cargo. Dimensions:—Length, 265 ft.; breadth, 40 ft.; depth, 23 ft. This vessel is built to the order of the Glen Shipping Co., Glasgow, has been chartered to load at Cardiff for the East, and will be under the command of Captain Kerr, Greenock.

**Isolde.**—The new racing 40-rater for Mr. Peter Donaldson, of Glasgow, was launched from Messrs. Fife's yard at Fairlie. The boat, which is named *Isolde*, is of an advanced type, and was designed by Mr. William Fife, jun. A. Hogarth, of Port-Bannatyne, is to have charge of her. She was taken off the beach on the builders' new pontoons, and the launch was very successful.

#### LAUNCH.—IRISH.

**Faugh-a-Ballagh.**—On March 27th there was launched at Cork harbour by the Passage West Dry Docks Co. a steel barge, built to the order of Mr. H. Lefroy, of Killaloe. The barge is  $71\frac{1}{2}$  ft. long, 15 ft. beam, and 6 ft. deep; and is designed to carry 80 tons deadweight on 4 ft. draught. The barge was named *Faugh-a-Ballagh*.

#### LAUNCH.—AUSTRIAN.

**Hapsburg.**—On April 10th a new Austrian Lloyd steamer was launched at Trieste, being christened *Hapsburg* by the Archduchess Marie Theresa. The *Hapsburg* says a Vienna correspondent, is the first large vessel built in the Lloyd yard, and is one of the three ships for the designs of which a prize was offered. A number of English and German firms competed, but an Austrian engineer, Herr Theodore Albrecht, secured the prize.

#### LAUNCH.—DENMARK.

**Helge.**—On March 19th the s.s. *Helge*, built by the Elsinore Iron Shipbuilding and Engineering Co., Denmark, for the Steam Navigation Co. "Danmark," of Copenhagen, was successfully launched at Elsinore. This steamer is built of steel to the highest class at Bureau Veritas' special survey, and her dimensions are 270 ft. by 37 ft.  $11\frac{1}{2}$  in. by 17 ft.  $10\frac{1}{2}$  in. depth of hold. The engines are of the triple-expansion type, with surface condenser, indicating 650 H.P.

#### TRIAL TRIPS.

**Savoy.**—On March 19th the s.s. *Savoy*, which has been built by the Montrose Shipbuilding and Engineering Co., Limited, ran her trial trip in Montrose Bay. There were present Mr. J. S. Doig, managing director of the company, Mr. R. Pollock representing the owners and others. The trial was very satisfactory, after which the vessel left for London. Her particulars are as follows: 130 ft. by 25 ft. by 18 ft. 4 in., having engines 15 in., 32 in. and 24 in., with boiler 11 ft. by 10 ft., and 130 lbs. working pressure. The vessel is one of three which the company are building just now; has been fitted with Messrs. R. Roger & Co.'s steam winches, Clarke, Chapman's patent windlass, and Fisher's steering gear, has winding masts and funnel and fitted with all the most modern improvements. She is to the order of Messrs. Joseph Constant, London. The vessel will carry about 1130 tons on 12 ft. draught, she has water ballast in double-bottom throughout and in after-peak tank. The company are preparing to lay down 12 barges for London owners.

**Granuaile.**—On March 28th, the s.s. *Granuaile*, recently launched by the Ailua Shipbuilding Co., Troon, for the Congested Districts Board for Ireland, ran the usual series of trials on the measured mile at Skelmorlie, when she attained a mean speed at the rate of  $10\frac{1}{2}$  knots per hour. Her dimensions are as follows:—Length, between perpendiculars, 150 ft.; breadth, moulded, 24 ft.; depth, moulded, 10 ft. 3 in. She is built under special survey, and is classed 100 A1 at Lloyd's, and has a Board of Trade passenger certificate. She is fitted with very handsome accommodation amidships, and for water ballast in double

bottom and peak tanks; has steam windlass, steam steering gear, installation of electric light, and is also adapted for carrying fish and cattle. Her engines have been fitted by Messrs. Muir & Houston, and are triple-expansion, 15 in., 23 in., and 29 in. cylinders, and 24 in. stroke. The builders and engineers, with a company of friends, went on board at Troon, the Board being represented by the Rev. W. S. Green, H.M. Inspector of Irish Fisheries, Dublin Castle, and Mr. Henry H. West, of Liverpool, who designed and superintended the construction of the steamer. After the trial the *Granuaile* proceeded to Dublin, making a good passage, notwithstanding the rough weather which prevailed in the Channel.

**Haslingden.**—On Tuesday, March 26th, the s.s. *Haslingden* went on her trial trip. She is a fine steel screw steamer of the following dimensions:—Length, over all, 280 ft.; breadth, 37 ft.; and depth, 20 ft. She has been built by Messrs. William Gray & Co., Limited, to the order of Messrs. Murrell & Yeoman, of West Hartlepool, and takes Lloyd's highest class. The deck erections consist of poop, raised quarterdeck, long bridge, and topgallant forecabin. A handsome saloon, state-room, and accommodation for captain and officers have been fitted up in the poop, and comfortable quarters for the engineers in the after end of the bridge, and for the crew in the fore end of the bridge. The hull is built with web frames, a double bottom is fitted under each hold for water-ballast, and there is also a large ballast tank in the after-peak. Four steam winches, donkey boiler, steam steering gear amidships, screw steering gear aft, patent windlass, schooner rig, boats on beams overhead, and all modern appliances have been fitted. The engines are of the triple-expansion type, working on three cranks. They have been supplied by the Central Marine Engine Works of Messrs. Wm. Gray & Co. The cylinders are 20 in.,  $81\frac{1}{2}$  in. and 58 in. in diameter, and the piston stroke 36 in. The boilers, built of steel, are of large size, and give an ample supply of steam at a working pressure of 160 lbs. per square inch. The vessel proceeded about noon into the Hartlepool Bay, and after Mr. Berry had carefully adjusted the compasses, the engines were put full speed ahead, running at about 80 revolutions per minute, the vessel making about  $11\frac{1}{2}$  knots per hour. Everything in the engine-room ran exceedingly well, the boilers giving an ample head of steam, and no trouble was experienced of any kind. The engine-room is fitted out with several of the specialities now so well known in connection with the Central Marine engines, the tail shaft being fitted with the patent shaft-preserver, and the high-pressure piston rod and spindle with Messrs. Mudd & Airey's metallic packing. Mudd's patent evaporator was also provided for supplying supplementary feed, and the engines are in every respect fully up to the best practice of the day. Captain J. Murrell and Mr. F. Yeoman, the managing owners, were on board to witness the trial, as was also Mr. G. T. Younghusband, their superintending engineer, under whose supervision the vessel and her machinery have been constructed. There was also on board a party of ladies, including Mrs. Younghusband, Miss Yeoman, Miss Murrell, Miss Thistle and others, who greatly enjoyed the fine weather trip to Middlesboro', to which port the vessel was taken immediately on the conclusion of the trial to load her first cargo. There were also on board Mr. Mark Harrison, Mr. Whyte, Mr. Brydon, junr., Mr. Yeoman, junr., and several other visitors. Mr. T. Mudd represented the engine builders.

**St. Ninian.**—On March 28th the screw steamer *St. Ninian*, recently launched by Messrs. Ramage & Ferguson, Limited, Leith, for the passenger service of the North of Scotland, and Orkney and Shetland Steam Navigation Co., Aberdeen, went on her trial on the Firth of Forth, and notwithstanding the strong gale and unsuitableness of the weather, the average speed was over 13 knots, the machinery working during the whole time without a hitch. Cabin accommodation is provided for 180 passengers, and the general finish and furnishings have been greatly admired, and we have no doubt she will shortly prove to be a favourite vessel on the north route. The directors present were Messrs. Ogston, Fortescue, Adam, Davidson, Webster, and the manager, Mr. Merrysees, who expressed their entire satisfaction with the performance of the steamer, and arranged to place her on the Orkney and Shetland route at an early date.

**Emperor.**—On March 28th the new steam trawler *Emperor*, which has been built by Messrs. Cochran & Cooper, Beverley, to the order of the Anchor Steam Fishing Co., Limited, Grimsby, went on her trial trip. The *Emperor* is of the following dimen-

sions:—93 ft. between perpendiculars, by 20 ft. 6 in. by 11 ft. depth of hold, and has triple-expansion engines of 40 N.H.P., which have been supplied by Messrs. C. D. Holmes & Co., Hull. The vessel behaved well, and showed herself to be a splendid sea boat, the machinery throughout the whole run working without the slightest hitch, the trial being thoroughly successful and entirely to the satisfaction of the owners.

**Benrath.**—On Saturday, March 30th, the s.s. *Benrath*, built by Messrs. Craig, Taylor & Co., of Thornaby-on-Tees, for Joseph Hoult, Esq., of Liverpool, proceeded to sea for her trial trip, which proved very successful in every way. The dimensions of the vessel are:—330 ft. by 43 ft. by 29 ft. 9 in. depth, moulded, to spar deck, and constructed to carry over 5,500 tons. The engines, which have been constructed by Messrs. T. Richardson & Sons, Limited, Hartlepool, for a working pressure of 200 lbs., proved highly satisfactory, and a good speed was maintained against strong head wind and sea. The owner was represented by Arthur G. Hay, Esq., of Liverpool, under whom the ship and engines have been constructed.

**Gustaf Wasa.**—On April 1st the trial trip of the s.s. *Gustaf Wasa* took place in the Sound, built by the Elsinore Iron Shipbuilding and Engineering Co., Elsinore, Denmark, to the order of the Steam Navigation Co., "Stockholm-Lubeck," of Stockholm. This steamer is built of steel to the highest class at Bureau Veritas special survey, and her dimensions are 143 ft. by 24 ft. 9 in. by 12 ft. 0½ in. depth of hold. The engines are of the triple-expansion type with surface-condenser. During the trial trip the engines indicated 435 H.P., the result being a mean speed of 10½ knots with a very moderate consumption of coal.

**Rocio.**—On April 2nd the s.s. *Rocio* went on her trial trip. She is a fine steel screw steamer built by Messrs. Wm. Gray & Co., Limited, to the order of Messrs. Orders & Handford, of Newport, Mon. She takes Lloyd's highest class, and is of the following dimensions:—Length over all, 243 ft.; breadth, 34 ft. 6 in.; depth, 17 ft. 3 in. Her deck erections consist of a raised quarterdeck, bridge deck, and topgallant forecastle. The saloon and accommodation for captain and officers have been fitted aft, and comfortable quarters for the engineers in the bridge, and for the crew in the forecastle. The vessel is built on the web-frame system, with a double bottom under each hold for water ballast, and there is also a ballast tank in the after-peak. Four steam winches, donkey boiler, steam steering gear amidships, screw steering gear aft, Emerson, Walker, & Thompson's patent windlass, schooner rig, boats on beams overhead, and all modern appliances have been fitted. The engines are of the triple-expansion type working on three cranks. They have been supplied by the Central Marine Engine Works of Wm. Gray & Co., Limited. The cylinders are 18 in. 28½ in., and 47½ in. diameter, and the piston stroke 33 in. The boilers, built of steel, are of large size, and give an ample supply of steam at a working pressure of 160 lbs. per square inch. There were present at the trial Mr. Handford, one of the owners, and Mr. John Boddy (under whose superintendence the ship and her engines have been constructed), representing the owners. Everything worked to the entire satisfaction of all concerned. On the completion of the trial the ship ran round to the Tyne to load for her first outward voyage, making the run from Hartlepool to the Tyne in less than two hours.

**Sylvania.**—On April 3rd the trial trip of the latest addition to the Cunard fleet, the twin-screw steamer *Sylvania*, took place on the Firth of Clyde. Built at Govan, the *Sylvania* is to be engaged in the cattle and cargo trade between Liverpool, New York, and Boston. The vessel is 460 ft. long over all, 49 ft. beam, 42 ft. 6 in. deep from shelter deck, and carries 6,500 tons deadweight. The hull is entirely of Siemens-Martin steel, including the rivets: the orlop, lower, main, and upper decks are steel, and the shelter deck is partially plated and then sheathed with pine. The vessel being twin-screw, the framing of the after end is carried out to meet the stern tubes, and ends in a massive steel casting on each side built into the hull. There are nine watertight bulkheads, extending to the upper deck and these are fitted with watertight doors on each side in the 'tween decks for the handy working of cattle or cargo. In addition to the double bottom, which is fitted for water ballast, there are four large deep tanks for trimming purposes—one aft and one forward, and one at each end of boiler space—and these are subdivided by fore-and-aft watertight bulkheads. In all there are 24

compartments for water ballast, and part of the double bottom under the engines may be utilised for carrying reserve fresh water for cattle or boiler use. The bulkheads are so arranged that any two compartments, and in some cases more, may be bilged and the vessel still keep afloat. Although built to Lloyd's highest class 100 A1, three deck, the vessel has special extra strengthening at the bilge and topsides, and, in addition to the usual Board of Trade survey, is in conformity with the American survey. The cattle fittings are on the most approved plan and comprise patent slingable fittings, which enable the whole space to be closed and utilised for cargo. The two sets of triple-expansion engines have cylinders 22½ in., 36½ in., and 60 in. diameter, by 48 in. stroke, and two large double-ended boilers fitted with Howden's forced draught. There is a large auxiliary boiler for winches, electric lights, &c. The propellers have bronze blades, and the shafting is of steel. As the result of the trial runs general satisfaction was expressed. The vessel was tried both on the measured mile and between the lights, and proved in every way satisfactory—a speed of 15½ knots being obtained between the lights. This speed is considerably in excess of what was required by the specification. The owners were represented on board by Captain Watson, Mr. Bain, and Mr. Rae.

**Selby.**—On Wednesday, April 3rd, the s.s. *Selby*, which has been built for and by Messrs. Ropner & Sons, Stockton-on-Tees, was taken to sea for trial trip. Her dimensions are:—Length, between perpendiculars, 280 ft.; breadth, 40 ft.; depth, moulded, 18 ft. 6 in.; and is classed as 100 A1 at Lloyd's. She has a break poop, raised quarter and partial awning deck extending continuously from abaft the engine-room right forward with chart-house amidships, and also large iron houses containing roomy accommodation for the engineers. The saloon and cabins for captain and officers are in the poop aft, and the crew and firemen are berthed in the forecastle forward. The steamer has web frames in all cargo holds, dispensing with beams, and has a cellular bottom and after peak tank for water ballast. Her triple-expansion engines are by Messrs. Blair & Co., having cylinders 21 in., 34 in., and 56 in. by 36 in. stroke, with two large steel boilers working at a pressure of 160 lbs., and fitted with an evaporator. Everything worked satisfactorily, a speed of 10½ knots per hour being obtained. The steamer is designed to carry 3,000 tons deadweight on 17 ft. 6 in.

**Mindello.**—On Saturday, April 6th, Messrs. Edward Finch & Co., Limited, of Chepstow, ran a most satisfactory trial trip of the screw tug *Mindello*, built by them to the order of the St. Vincent Cape Verde Islands Coaling Co., Limited, of 4, Fenchurch Avenue, London. The tug, which is 55 ft. by 12 ft. 6 in. by 7 ft. 6 in., is fitted with compound surface-condensing engines 11 in. and 22 in. by 16 in. stroke. She sailed on April 10th for Cape Verde, where she is to be used at the depot for towing barges alongside steamers for coaling. Messrs. Finch & Co. are supplying 20 large barges to the company for this purpose.

**Effort and Empress.**—On April 10th the two steam trawlers, *Effort* and *Empress*, recently built for the Great Western Steam Fishing Co., Hull, by Messrs. Mackie & Thomson, shipbuilders, Govan, and engined by Messrs. Muir & Houston, engineers, Kinning Park, Glasgow, went down the Firth of Clyde on their official trial trip. Both vessels, which are fitted out with every accessory of a modern equipped engine-room, attained the most satisfactory speed results of 10 knots. After landing the representatives of the builders' and engineers' firms at Gourock, the vessels proceeded by way of the North of Scotland to their destination at Hull.

**Scotsman.**—On April 11th the trial trip of a new steamer, named the *Scotsman*, built by Messrs. Harland & Wolff for the British and North Atlantic Steam Navigation Co., the managers of which are Messrs. Richards, Mills & Co., of Liverpool, took place in Belfast Lough. The ship, like the other vessels owned by the same company, is intended to sail in the Warren Line. She is upwards of 6,000 tons register, and of the following dimensions:—Length, 470 ft.; breadth, 49 ft.; depth, 29 ft. 5 in. She is propelled by two sets of triple-expansion surface-condensing engines, with cylinders 22 in., 36½ in., and 60 in. diameter and 40 in. stroke. After a satisfactory trial and adjustment of compasses the *Scotsman* left for Liverpool.

**Throstlegarth.**—On April 18th the s.s. *Throstlegarth*, built by Messrs. Palmer's Shipbuilding and Iron Co., Limited, to the

order of Messrs R. & J. H. Rea, of Liverpool, was taken to sea for her official steam trial. Her dimensions are as follows:—Length, between perpendiculars, 260 ft.; beam, 36 ft.; moulded depth, 19 ft. 7 in., and is built to Lloyd's highest class under special survey. She has a long raised quarterdeck extending to after end of machinery space, and fitted with accommodation for the captain, officers, and engineers; and a topgallant forecabin for the crew. The hull is built of steel with cellular double-bottom throughout, except in the engine and boiler space; and is fitted with three powerful steam winches and donkey boilers, patent direct-acting steam windlass, large self-trimming hatches, steam steering gear amidships, screw steering gear aft, and all modern gear for rapid loading and discharging cargo. The engines and boilers, which have also been built by the Palmer Co., are of the triple-expansion type with cylinders 20 in., 33 in., 54 in. and 36 in. stroke, and two steel boilers working at a pressure of 160 lbs. per square inch. The vessel is designed to load about 2,300 tons deadweight on 18 ft. draught of water, and has been constructed under the supervision of Mr. J. B. Edmiston, consulting engineer, of Liverpool. During the trial trip the engines worked for a considerable time at 84 revolutions per minute in a highly satisfactory manner, and a mean speed of 11.09 knots per hour was attained on the measured mile, after which the vessel proceeded to Cardiff to load.

**Benridge.**—On Thursday, April 18th, the s.s. *Benridge*, built by Messrs. Craig, Taylor, & Co., of Thornaby-on-Tees, for Joseph Houlst, Esq., of Liverpool, was taken to sea for her trial trip, which proved highly successful. She is a sister ship to the *Bewrath*, lately sent away by the same builders, the dimensions being 380 ft. by 43 ft. by 29 ft. 9 in. depth, moulded, and constructed to carry over 5,600 tons. The engines, which have been constructed by Messrs. T. Richardson & Sons, Limited, Hartlepool, for a working pressure of 200 lbs., proved highly satisfactory, and a speed of 10 knots was easily maintained over a course of 46 miles. The owner was represented by Arthur C. Hay, Esq., of Liverpool, under whom the ship and engines have been constructed.

**Murcia.**—On April 18th the new screw steamer *Murcia*, built by Messrs. John Readhead & Sons, West Docks, South Shields, to the order of the English and American Shipping Co., Limited, of which the managers are Messrs. O. T. Browning & Co., London, was taken to sea on her official trial trip. Her dimensions are as follows:—Length, 308 ft.; breadth, 41 ft. 6 in.; and depth, 21 ft. 7 in. The vessel is built of steel, and is of the partial awning deck type, and has a carrying capacity of 8,960 tons deadweight. She has been built under special survey, is classed 100 A1 at Lloyd's, and is fitted with all the latest improvements and appliances for the working of the vessel, and for rapid loading and discharging of cargo. Her engines, which are of the triple-expansion type, are also supplied by Messrs. John Readhead & Sons, and have cylinders 23 in., 36 in., and 61 in. diameter, by 42 in. stroke, and working at a pressure of 160 lbs., steam being supplied from two large steel boilers. After having compasses adjusted the vessel steamed north and south, her speed, &c., being thoroughly tested over the measured mile, a rate of 11 knots being attained. The engines worked very smoothly, the trial being highly successful and satisfactory to all concerned. This is the fourth steamer built for the company by Messrs. Readhead & Sons.

**Royalist.**—On April 19th this turret-deck steamer was taken on her official trial, when a mean speed of 12 knots were registered, her total deadweight capacity being 5,200 tons, on 20 ft. 6 in. draft. She has been built by Messrs. William Duxford & Sons, Limited, of Sunderland, to the order of Messrs. Angier Bros., London, and has received the highest class in both the British Corporation and Bureau Veritas registries.

**Mogul.**—On Saturday, April 20th, the new steel screw steamer *Mogul*, built by Sir Raylton Dixon & Co., Cleveland Dockyard, Middlesbrough, for the China and Japan trades, to the order of the Mogul Steamship Co., of which Messrs. Gellatly, Hanky, Sewell & Co., of London, are managers, was taken to sea on her official trial trip. Her dimensions are as follows:—Length, 372 ft.; breadth, 45 ft. 6 in.; depth, 28 ft. 4 in. The vessel, which is a beautiful model, has a carrying capacity of about 5,500 tons deadweight. Her decks are all of East India teak, and she is fitted in every way in a first-class manner for the Eastern trade. Triple-expansion engines have been fitted by Messrs. The Wallsend Slipway and Engineering Co.,

Limited, of Newcastle-on-Tyne, with cylinders 27 in., 44 in., and 72 in., by 48 in. stroke, and working at a pressure of 170 lbs., steam being supplied from two single-ended boilers fitted with Howden's system of forced draught. The trial was highly successful and satisfactory to all concerned, a speed of 13 knots being attained with ease. At the conclusion of the trip the vessel returned to Middlesbrough to load. The hull and machinery have been constructed under the supervision of Mr. F. Edwards, 62, Bishopsgate Street Within, London, consulting engineer to the owners, and Captain Johnson the owners' superintendent. Sir Raylton Dixon & Co. have a sister vessel alongside their yard nearly completed for the same owners.

**Progressist.**—On April 24th this turret-deck steamer was taken on her official trial, when a mean speed of 11½ knots was registered, with 5,080 tons deadweight aboard. Her total deadweight capacity being 5,200 tons on 20 ft. 6 in. draft. She has been built by Messrs. William Duxford & Sons, Limited, of Sunderland, to the order of Messrs. Angier Bros., London, and has received the highest class both in the British and Bureau Veritas registries.

**Fort Salisbury.**—The large steel screw steamer *Fort Salisbury*, built by Sir W. G. Armstrong, Mitchell & Co., at their Walker shipyard, for Messrs. Bucknall Brothers on behalf of the British and Colonial Steam Navigation Co., has lately completed her speed trials. The *Fort Salisbury* is the second of three sister vessels built by Messrs. Armstrong, Mitchell & Co. for the above company's new service to the Cape and East Coast of Africa. The *Fort Salisbury* is a vessel of 6,000 tons, and fitted out for passengers and cargo. She was taken for a series of runs on the measured mile off Whitely, a mean speed of over 14 knots being shown. The machinery has been constructed by Messrs. Hawthorn, Leslie, & Co.

**Hersilia.**—The steam yacht *Hersilia*, recently launched by Messrs. Ramage & Ferguson, Limited, Leith, for the Rev. John Hutchison, D.D., Afton Lodge, went on her trial on Tuesday, April 16th, on the Firth of Forth, and, notwithstanding a strong easterly wind, the average speed on the measured mile was 18½ knots.

## Reviews.

*The Indicator and its Practical Working.* By A. G. Brown. The Globe Engineering Co., Limited, of 38, Victoria Buildings, Manchester, and 7, Billiter Buildings, London, E.C.

THE introduction to this book gives a concise and interesting history of the indicator from the inception of the idea, by James Watt to the present day, taking one through many of the various stages of improvement through which the instrument has passed before reaching its present state of accuracy and efficiency. The Tabor indicator is taken throughout the book as the standard instrument for illustration and description, and one cannot help feeling that either the author or publishers has or have some special interest in pushing the particular merits of this apparatus. After a careful description of this particular instrument and the methods of practically working it, various gears for the correct transmission of the motion of the piston to the paper drum of the indicator are described and illustrated in a very lucid and complete manner.

A number of typical diagrams are given showing the particular objects for using the indicator, the defects in the diagrams being pointed out, what the probable reason was for the existence of the defects, and finally a set of diagrams is shown in each case after the defects have been remedied. The use of the indicator on locomotives is then fully gone into and numerous striking examples are given showing the advantage derived by the examination of indicator cards as a means to detect defective working of the mechanism. A very interesting and useful chapter is given on the use of the indicator in connection with a feed-water or condenser test in determining the number of pounds of steam consumed per I.H.P. per hour by an engine. In connection with this particular application some very useful tables are given with reference to the cylinder condensation for various positions of cut-off in simple compound and triple-expansion engines. The author then proceeds to give a simple exposition of the thermal unit measure of engine performance, and illustrates his remarks by four simple examples. The next point dealt with is the important one as to the amount of steam



accounted for by the indicator, and in reference to this matter some useful tables are given. The testing of the quality of steam by a calorimeter is also fully described and illustrated, as also is the method of locating the clearance line on a diagram. The location of the point of cut-off and the combination of diagram from compound and other stage expansion engines, are also fully described. A variety of useful formulæ and tables are given at the end of the book. Taking the publication as a whole, we think that it is both instructive to students desirous of mastering the principles involved in the treatment of thermo-dynamic problems, and useful as a reference book to those more advanced in the science.

It is somewhat remarkable that in these days of advanced scientific knowledge, so much ignorance exists among users of steam motors as to the enormous waste of money in the shape of coal, from causes that could be readily remedied if the problem were only attacked by those who are sufficiently armed with technical knowledge to find a ready solution to the difficulties, and we feel sure that books of the nature of that now being reviewed will do much to dispel such ignorance and prove a benefit not only to the users of the motor but to the nation in general, by the fact of inducing a better conservation of energy among our industrial undertaking.

*The Universal Electrical Directory* (J. A. Berly's). London: H. Alabaster, Gatehouse & Co. 1895.

This is the fourteenth annual issue of this directory to the electrical and kindred trades. The names are classified under the heads of Foreign, British, Colonial and American, and arranged both according to trades and in alphabetical order. There are thus eight sections in the work and the commencement of each of these lists is made easy of reference by a very ingenious arrangement of tags let into the margin of the paper. Not only are the names and addresses of firms and of individuals given, but their telegraphic addresses are noted, and in the case of limited companies some particulars as to share capital are afforded.

As a sort of frontispiece, there is given a large sheet reprinted from the *Electrical Review*, which shows all the central electric lighting stations of Great Britain. The officers of the most important institutions connected with electricity are also given, and the large number of advertisements in the volume are made attainable by an index. A small bibliography of electricity will be found at page 55, and this will greatly add to the usefulness of the volume.

The only adverse criticism to which the volume can possibly lay itself open is that the compiler's definition of what comes within "allied trades" is somewhat too wide. But we cannot take exception to this, for though we find names herein whose direct connection with electricity may be difficult to trace, they are those of firms who are wont to supply requisites for most large establishments, and it is well to give more than is needed than too little. The book should have a very wide circulation, and its moderate price, 4s., is not its least recommendation in these days, when there are so many claims upon business men.

*The Engineer's Year-Book of Engineering Formulæ, Rules, Tables, etc.* By H. R. Kempe. London: Crosby Lockwood & Co. 1895.

In reviewing the first edition of this work, published a year ago, we commented very favourably upon the range, method of treatment, and general get-up of the volume. We are therefore pleased to learn that the author has met with the success he deserved, it having, according to his statement in the new edition, "much exceeded his expectations." Last year we remarked upon the fact that though there was much useful information regarding the ordinary marine boiler and the Babcock & Wilcox water-tube boiler, yet there was no mention of the marine water-tube boilers which were then attracting so much attention. The year that has elapsed has brought the Belleville and its various rivals for public, and especially Admiralty, patronage, so much to the front, that the addition now made to this volume of details regarding these steam-raisers will be most acceptable to the engineering profession.

A large part of the volume has been re-written, as for example, the sections relating to cotton mills and girders and bridges. The whole of the statistics furnished have been brought down to date, the logarithmic tables have been extended, and some very interesting information relating to modern engineering practice in America has been added to the

article on the "Proportions of Parts in Steamships." The book is well got-up, as was its first edition, and it is likely to prove as useful as its predecessor. We notice one simple and obvious printer's error on page 585, where, under the head of "Builder's Measurement," the word "stem" has been given as "stern," but the context is so clear that no one could be confused by it.

*Plating and Boiler Making.* By the Foreman Pattern Maker. London: Crosby Lockwood & Co. 1895.

LIKE all the works from the pen of the Foreman Pattern Maker, this book approaches its subject from the most practical point of view. His work is not so much for use in the office, or even in the shop, as in the workman's own dwelling. He believes that no man can be considered a good workman if he merely fulfils his appointed task without inquiring the why and the wherefore of what he does, and neglects to learn the theories and facts upon which the present-day practice is based. The volume before us runs to nearly four hundred pages and is fully illustrated, some of the blocks being exceedingly well finished. Thus he is able to treat a most important subject in a manner which it deserves. Boiler-making has long been free from the reproach of its early days. The writer remembers a speech of Dr. Denny, when presiding at the dinner of the Institute of Marine Engineers a year or two ago, in which that gentleman gave some interesting reminiscences of the casual way in which the low-pressure boilers, even of his early days, were put together. They were not expected to be absolutely tight, to begin with, and the theory of using the material to give the greatest strength and efficiency for a given weight was entirely unknown. Now all that is changed: there have been innumerable experiments made, notably those by Mr. Kirkaldy, as to the strength of every part of the materials employed, and as to the strains and stresses laid upon the plates, stays, and rivets, both by the pressure of the steam and by the alterations in the temperature of the fabric. In this book a vast amount of knowledge gleaned from these experiments is tabulated and put ready to hand for the inquirer.

In pursuance of the exhaustive plan of treatment which he has set before him, the writer tells us in separate chapters of the tools employed, and of the materials worked up, the latter being naturally followed by a chapter on the testing of materials whereby it is accurately known what the materials in truth are. Perhaps one of the most noticeable features of modern development in this department is covered by the chapter on the limiting dimensions and weights of materials. For here we see collected for us the very numerous shapes and thicknesses of plates, bars, angle-irons, bulbs, tees, channels and other forms which are supplied by the great manufacturers together with some indication of their usual prices and of the probable extra cost of having any alteration made in the standard forms usually supplied. We see here how numerous are the forms of bars now used in boiler-making and its kindred arts, and how largely the ingenuity of the manufacturer has enabled the builder to effect economies in weight of the fabric without injury, and indeed with benefit, to the strength and life of the fabric.

Cutting, bending, flanging, punching and rivetting are all treated from his practical point of view, and not only are the machines used for these purposes illustrated but the methods of using them are explained and some of the common faults and difficulties dwelt upon in a very instructive manner.

Space will not allow us to give a more detailed description of the book, but we have said enough to show that it is a thoroughly workmanlike and exhaustive work, and we may add that as far as we can see it is brought down to the very latest practice, and it will no doubt prove a very useful work to a large circle of practical men.

*Refrigerating Machinery and its Management.* By A. Ritchie Leask. London: The Tower Publishing Co. 1895.

WITH the almost universal introduction of refrigerating plant into modern steamships, a handbook on the subject of cold installations and their management will certainly be welcome to marine engineers. The introductory chapter, giving as it does a most interesting account of the various uses both by land and sea to which these appliances can be put, would show how necessary it is for the modern engineer to be acquainted with this branch of his duties. The astonishing thing about this vast trade is its comparatively recent origin. In 1880, we are told, only 400 carcasses of mutton were imported. Next year



the *Strathleven* with a Bell-Coleman installation brought another consignment. She was followed by the *Protos* and later in the same year by the Orient liner *Orient*, and then the frozen meat trade was fairly under way. By 1893 the annual import into this country had risen to two and a-half million carcases. But not content with the immense expansion of this carriage of mutton the shipowner saw that the installation might be used for the carriage of other goods, and in May, 1895, the *Oceana* left Melbourne with the first lot of southern fruit. The difference of treatment between animal and vegetable products is easily understandable when explained by the author, but in the first voyages the management of the fruit must have laid great responsibility on those in whose charge it was placed.

The interesting resume of the expansion and usefulness of the trade is followed by a dissertation on the theory and laws and heat and, we think, for once the author is not quite up to date. He says: "The most intense cold as yet known was produced by Professor Faraday during his experiments on the liquefaction and solidification of gases . . . an intense cold 166 degrees Fahrenheit was obtained." Surely the recent experiments in the liquefaction of oxygen by Professor Dewar have, during the last twelve months, shown us a temperature to which 166 F. is comparatively hot.

Having discussed the natural laws which govern the subject Mr. Leask tells us of the gradual development of refrigerating apparatus from the experimental to the practical stage. He describes the well-known forms patented by Linde and by Messrs. Hall, of Dartford. Coming to this part of the work he tells of the duty to be expected from the machines and gives full and plain accounts of the various kinds of installations, descriptions which are rendered even more easily intelligible by numerous accompanying cuts. Two types of machines, well known in the United States for stationary purposes, are De La Vergne and the Eolipse. Descriptions of several others are given, and the rationale with the disadvantages and strong points of each are made clear. Many hints on the erection, management and working of installations are given, together with hints as to the "crews" required to operate factories. The whole is completed by an appendix of tables which are likely to prove useful. We have not indicated by any means all the heads upon which Mr. Leask gives information, but we hope we have said enough to show that the present volume will be very usefully studied by the marine engineer, and will be a very welcome addition to his library.

## Correspondence.

[It must be understood that, in giving insertion to communications under this heading, we do not in any way pledge ourselves to the opinions proffered therein. We will with pleasure insert any letters likely to benefit our readers, either from their intrinsic value or as being calculated to promote such discussion as will elicit facts valuable from their being the result of practical experience.—Ed. M. E.]

### NEW PATENT LAW FOR PORTUGAL.

To the Editor of THE MARINE ENGINEER.

DEAR SIR,—By advice just to hand we have received information that a new Patent Law has been published in Portugal, which will tend to the further development of industrial enterprises in that country. We have not yet received a full text of the new law, but we find that many of the defects of the existing law are corrected, and perhaps what is of more importance to English inventors desiring to secure patents and protect their inventions in Portugal, the fees payable are much less than at present, so that the costs of obtaining a patent will be considerably reduced.

Although Portugal cannot be included amongst first-class industrial countries it should not be completely overlooked by inventors, as during the last few years it has devoted considerable effort and energy towards industrial progress.

We will shortly furnish you with further particulars of the new law.

Yours truly,

W. P. THOMPSON & Co.,  
Patent Agents.

Manchester, Liverpool, and London,  
9th April, 1895.

## Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from March 14th, to April 9th, 1895.

- 5368 A. G. Brookes (P. Armington, United States). Steam engines.
- 5371 H. Beresford. Smoke-burning furnace for boilers.
- 5389 R. Wootton and B. Hewitt. Manufacture of seamless steel tubes.
- 5405 F. Edwards. Steam cylinder awnings.
- 5412 E. A. B. Woodward. Feed-water heating apparatus.
- 5454 T. Dawson. Smoke consumer for steam boiler.
- 5456 H. Mechan. Making of ships' side-lights.
- 5457 A. G. Lyster. Subaqueous dredgers.
- 5520 F. D. Thomsett. Safety valves for boilers.
- 5531 A. C. S. B. Leslie (F. D. Klapp, United States). Alarm gauges for steam boilers.
- 5563 J. Lambert. Closing watertight doors.
- 5593 S. A. Johnson. Feed-water heater, &c.
- 5608 T. S. Mossman. Circulator and feed heater.
- 5610 D. F. Black. Watertight bulkheads.
- 5621 A. Forster and N. Pirrie. Steam generators.
- 5629 M. J. Darg. Propulsion of torpedoes.
- 5639 E. Cunningham. Packing for piston-rods.
- 5688 J. Tally. Ventilation of cellular ships.
- 5713 E. F. Allnut. Cap for lubricators.
- 5726 J. B. Knights and H. Cutting. Steam engines.
- 5736 J. Fairhurst and J. Fairhurst. Fire-bars.
- 5740 O. D. Orvis. Steam boiler.
- 5769 W. W. Hutchinson. Wrenches.
- 5800 I. A. Cawley. Chains and ships' cables of any material.
- 5807 J. Johnston. Tachometers or speed indicators.
- 5810 J. Mills. Steam boilers.
- 5822 W. de C. Prideaux. Funnels.
- 5835 M. T. Neale and C. E. Monkhouse. Utilising the motion of waves.
- 5842 O. Friederici. Boiler furnaces.
- 5869 J. S. White and J. L. White. Steam boilers.
- 5870 J. E. Walsh. Floating derrick cranes.
- 5874 T. Sherratt and W. S. Willson. Bearings.
- 5880 W. A. Bain. Regarding the speed of ships.
- 5930 B. Swinton. Preventing boiler explosions.
- 5960 J. G. Calvert. Cleaning feed-water heaters.
- 5962 J. A. Hopkinson. Apparatus for heating water.
- 5968 H. K. Bridger. Sounding apparatus for ships.
- 5976 S. Crookery. Sextants and other instruments.
- 5978 C. Davies. Ships' lights.
- 5982 G. H. Mann. Expansion gear for slide valves.
- 6030 J. Robertson. Preventing foundering of ships.
- 6031 G. S. de Livet. Boilers, furnaces and flues.
- 6037 A. B., H. W., H. E. White and H. A. Fenn. Engine.
- 6044 J. Davison. Automatic cable grip for ships.
- 6050 A. C. Chapman (G. P. Boughton, at present on the high seas). Sea anchor.
- 6064 J. N. Beavor. Preventing damage to vessels.
- 6099 A. J. P. Whitaker. Preventing corrosion of shafts.
- 6106 P. Watts and M. Sandison. Propelling engines.
- 6154 C. H. Bachy. Furnaces.
- 6155 F. Felzer. Pumps.
- 6157 M. H. Robinson and M. H. P. R. Sankey. Steam engines.
- 6159 E. Vickers. Heating furnaces.
- 6160 J. Giriot and C. Castin. Weldless chains.
- 6199 J. A. Steven. Piston-rods of hydraulic cylinders.
- 6204 W. B. Cumming. Multi-cylinder steam engine.
- 6208 F. W. Webb. Water gauge attachments.
- 6221 J. H. Rosenthal. Superheaters for steam generators.
- 6225 W. M. Walters. Working of derricks.
- 6227 F. H. Brooke. Slow combustion furnaces.
- 6234 J. V. Rice, junr. Oscillating piston steam engines.
- 6274 H. S. Maxim. Steam engines.
- 6288 G. Round. Coupling joints for tubes.
- 6305 F. Roomf. Boat.
- 6358 J. Nelson. Fire-grate bars for furnaces.
- 6367 A. J. Hayward. Emptying bilge water from boats.
- 6403 G. H. Sankey. Lifebuoys.
- 6406 H. M. Steinthal. Sheathing ships and other vessels.

- 6418 W. C. Gilles. Lubricator for fishing lines.  
 6420 E. Howl and W. W. Attwood. Valves for pumps.  
 6454 J. H. Innes. Preventing corrosion in boilers.  
 6469 W. McIntosh. Man-way cover and dust box.  
 6523 The Brayton Petroleum Motor Company, Limited, and H. Townsend. Engine governing apparatus.  
 6535 F. W. Beck. Water heating boiler.  
 6573 G. W. Heath. Compasses.  
 6598 E. W. Lloyd and O. W. Hutchinson. Launching torpedoes.  
 6599 W. J. Pirrie. Winches.  
 6604 C. C. Braithwaite. Stuffing-box packing.  
 6605 G. R. Roberts. Float.  
 6625 S. Carter. Tool for cutting boiler tubes, &c.  
 6628 E. and F. J. M. Chapman. A floating rope.  
 6640 A. Denny and W. Gray. Instrument for ascertaining the metacentric height of a ship.  
 6687 A. Cocks. Packing for piston-rods.  
 6688 B. W. Barker (W. F. Burroughs, United States). Anchor.  
 6691 A. G. Schaeffer. Safety appliance for boilers.  
 6699 J. G. Calvert. Cleaning feed-water heaters.  
 6703 J. Smith and O. Wynn. Steam engine valve.  
 6708 J. Clarkson. Submarine search-lights for ships.  
 6746 P. and J. J. Meehan. Steam boilers.  
 6779 E. J. Woolf. Valves for compound engines.  
 6780 C. D. Abel (The Deutsche Metallpatronenfabrik, Germany). Tubes.  
 6787 H. Prinz. Centrifugal speed indicators.  
 6794 E. le Doux. Paints for coating bottoms of vessels.  
 6835 J. H. Gibson. Indicating the opening of valves.  
 6844 T. Hampton. Manufacture of steel.  
 6847 H. Taylor and W. Ginman. Hauling out slipway.  
 6884 J. G. Lovering. Nautical recording apparatus.  
 6922 J. E. Hornby. Funnels.  
 6949 W. J. Pitt. Tethering stanchions for ships.  
 6977 A. Morcom and G. E. Bellias & Co. Steam engines.  
 6990 D. Thomson. Valves.  
 7005 E. Clucas. Vacuum-displacing propelling blade.  
 7014 Davis & Co. and W. R. G. Hay. Controlling valve apparatus.  
 7021 A. Schmedtje. Valves for steam engines.  
 7036 A. W. Cash. Pressure regulator and governor.  
 7038 E. F. Wailes. Steam generators.  
 7057 J. J. Mather. Pneumatic pontoons flotilla.  
 7074 J. A. Ashley. Steam generators.  
 7087 J. H. Christensen and R. L. A. Schiffer. Unsinkable boat.  
 7138 J. J. Tinker and E. Hollinworth. Forced draught furnaces.  
 7197 J. F. Weatherley. Petroleum engines.  
 7202 J. Wood. Raising and lowering ships' boats.  
 7207 G. A. Billington. Ships' berths and bed bottoms.

**Hull and District Institution of Engineers and Naval Architects.**—On Monday evening, April 8th, a paper was read by Mr. W. H. Willatt before the members of the above Institution on "Electrical Measurements," the President (Mr. F. H. Pearson) in the chair. The paper dealt with the origin of electrical units, and the firm scientific basis upon which they were founded, and compared them with methods of measuring which involved the use of the foot, the pound and the gallon. Various instruments and methods of electrical measurement, which had been necessitated by recent developments of electrical machinery and appliances, were described; several electrical measuring instruments of modern design were exhibited on the lecture table, including Lord Kelvin's mirror galvanometer, Wheatstone's bridge, an improved form of quadrant electrometer, a differential galvanometer, various standards, &c., &c. A short discussion followed, in which Messrs. F. H. Pearson, A. N. Somerscales, G. H. Strong and Mr. A. H. Gibbings (Borough Electrical Engineer) took part, at the close of which a hearty vote of thanks was accorded Mr. Willatt on the motion of the President, seconded by Mr. M. Stirling.—The next paper will be one on "Water-tube Boilers," by Mr. A. E. Seaton.

**The New Palace Steamers (Limited).**—It has been arranged that during the ensuing season the steamers *La Marguerite*, *Royal Sovereign*, and *Koh-i-Noor*, shall be managed and run by the New Palace Steamers (Limited), the offices of which company are at 50, King William Street, E.C. It is expected that the sailings will commence on Saturday, the 1st of June.

## BOARD OF TRADE EXAMINATIONS.

### Extra First Class.

April 20th, 1895.—L'Estrange, A. H. .... Ex. 1C Leith  
 " " " —Mathieson, D. .... Ex. 1C Glasgow  
 " " " —Tremain, William .... Ex. 1C Leith  
 " " " —Young, George .... Ex. 1C Cardiff

NOTE.—1C, denotes First Class; 2C, Second Class.

### March 30th, 1895.

Brown, A. A. .. 1C London  
 Brown, David .. 2C Glasgow  
 Bryant, Ed. E. 2C N.Shields  
 Boucher, R. E. 2C Liverpool  
 Dean, Oswald .. 2C "  
 Elliot, James .. 2C London  
 Emalie, Jas. .... 2C Aberdeen  
 Ford, A. H. .... 2C Dover  
 Gibson, J. H. .. 1C N.Shields  
 Gowan, David 2C Liverpool  
 Holland, Louis 2C "  
 Inglis, George .. 2C Aberdeen  
 Lawson, Robert 1C N.Shields  
 Leay, Richard 2C Liverpool  
 Lloyd, Arthur .. 2C "  
 Neil, James .... 1C N.Shields  
 Oliver, J. W. .. 2C "  
 Read, Wm. S. 2C "  
 Rennie, Wm. .. 1C Glasgow  
 Riddle, John .. 2C N.Shields  
 Roberts, D. F. 1C London  
 Seymour, G. H. 2C N.Shields  
 Sharman, R. S. 2C "  
 Simpson, J. B. 1C Aberdeen  
 Simpson, J. B. 1C N.Shields  
 Smith, John .. 1C Aberdeen  
 Urquhart, John 2C Liverpool  
 Walls, John .. 1C Glasgow  
 Wood, Wm. T. 2C N.Shields  
 Younger, Robt. .. 2C Aberdeen

### April 6th, 1895.

Burgess, W. B. 2C N.Shields  
 Clouston, J. H. 2C "  
 Croft, W. H. .. 1C "  
 Douglas, Joseph 2C London  
 Ericsson, O. M. 1C N.Shields  
 Fawcett, R. W. 1C "  
 Findlay, Alex. 1C "  
 Foster, Thos. .. 1C "  
 Freeman, A. J. 1C "  
 Gunn, Wm. .. 2C London  
 Hall, Joseph .. 2C N.Shields  
 Heath, A. H. .. 2C London  
 Holley, R. O. .. 1C London  
 Howey, J. W. 2C N.Shields  
 Hutton, J. C. .. 1C London  
 Jones, H. E. .. 1C Cardiff  
 Lewis, Edgar .. 2C "  
 Macvicar, J. L. 2C Liverpool  
 McGill, John .. 2C "  
 McClelland, Os. 1C N.Shields  
 Payne, Jack .. 2C Liverpool  
 Pearson, O. H. 1C N.Shields  
 Pickett, A. E. .. 2C Falmouth  
 Piggford, J. .. 2C N.Shields  
 Plumley, Geo. 2C "  
 Quixley, E. W. 2C Hull  
 Robertson, Wm. 1C "  
 Robson, J. W. .. 2C N.Shields  
 Rowell, Geo. W. 2C "  
 Scott, J. T. .... 2C "  
 Stewart, R. J. 1C Cardiff  
 Stokoe, F. A. .. 2C N.Shields  
 Thomas, Jno. .. 1C Cardiff  
 Thompson, J. H. 2C N.Shields  
 Thompson, J. W. 1C "

### April 18th, 1895.

Andrews, J. M. 1C Greenock  
 Barclay, W. F. 1C "

Barron, R. S. .. 2C Liverpool  
 Bennett, Ernest 1C London  
 Birkenshaw, S. 2C Liverpool  
 Bowden, Joseph 2C Leith  
 Chalmers, H. W. 1C "  
 Christison, D. .. 1C "  
 Davidson, D. L. 2C "  
 Fleming, W. G. 2C Greenock  
 Kerr, Donald .. 2C "  
 Kirby, S. O. .. 1C London  
 McKersie, J. .. 1C Dublin  
 Peden, J. F. .. 1C Greenock  
 Ramsay, A. .. 2C Leith  
 Reid, J. L. .. 2C "  
 Shuttleworth, F. 1C "  
 Thompson, J. W. 2C London  
 Wheeler, W. H. 2C "  
 Whiteside, W. H. 2C Liverpool.

### April 20th, 1895.

Alderson, Joseph 1C Cardiff  
 Coleman, C. P. 1C "  
 Cooper, Sidney 1C N.Shields  
 Davies, Thomas 2C Liverpool  
 Davison, S. E. 2C Cardiff  
 Diaper, W. H. 2C "  
 Dixon, Frank .. 2C N.Shields  
 Dunn, John .. 2C N.Shields  
 Dyer, J. C. .. 2C London  
 Eilerker, C. P. 1C "  
 Findling, Harry 2C W.H'pool  
 Findlay, Alfred 2C London  
 Forrest, D. .. 1C N.Shields  
 Fraser, Frank 2C Glasgow  
 Gibb, James .. 2C N.Shields  
 Goodyear, W. V. 1C Cardiff  
 Gordon, Charles 1C London  
 Gorton, R. W. 1C Cardiff  
 Grant, John .. 2C N.Shields  
 Greenshields, A. 2C "  
 Gronhang, S. N. 1C Cardiff  
 Harper, G. E. .. 1C N.Shields  
 Heseltine, R. B. 2C W.H'pool  
 Hoy, W. M. .. 2C Aberdeen  
 Hutchinson, Jn. 1C Glasgow  
 Jarren, Gustav. 1C W.H'pool  
 Machin, Edwin 1C Cardiff  
 Machin, S. L. .. 2C "  
 Mason, F. K. .. 2C W.H'pool  
 Mitchell, Wm. .. 2C London  
 Moir, R. B. .. 2C N.Shields  
 Montgomery, D. 2C London  
 Noble, Harry .. 2C W.H'pool  
 Oakley, W. E. .. 1C Cardiff  
 Park, Thomas .. 2C Glasgow  
 Peacock, D. T. 1C "  
 Powell, Walter 1C W.H'pool  
 Ramsay, R. .... 2C "  
 Rankine, D. K. 1C N.Shields  
 Shaw, David .. 2C Dundee  
 Smith, David .. 2C "  
 Stormont, A. .. 1C Aberdeen  
 Summers, F. T. 1C N.Shields  
 Talbot, Charles 2C London  
 Thompson, J. .. 1C Cardiff  
 Thornbeck, B. B. 2C "  
 Wellock, John .. 2C N.Shields  
 Westington, F. 2C "  
 Williams, D. .. 1C Cardiff  
 Wylie, S. J. .. 1C Londerry  
 Young, J. G. .. 1C Aberdeen

## The Marine Engineer.

LONDON, JUNE 1, 1895.

FOR a very long time shipbuilders in this country have, in one way and another, been slowly killing the proverbial goose that lays the golden egg. There was a time, for example, when shipbuilders were induced to accept the services of foreign "improvers" in their drawing offices with good and legitimate reason. The young men hailing from the technical schools of the Continent could not only be had cheap, but could really give points to the plain, practical and comparatively uneducated draughtsmen of this country, in so far as mathematical and scientific knowledge was concerned. On the other hand the amount of "spoil" in the way of practical experience, "tips" and data, which these same highly scientific youths contrived to take away with them was never very deadly. For some considerable time, however, the competitive struggle for "work to do" on the part of shipbuilders and engineers has been so great, that in order to secure orders from abroad, or as a bid for "more to follow," many firms have opened wide their gates and offices—if not their books of data—to students and improvers directly sent by, or in whom foreign countries and shipping, and shipbuilding firms are closely interested. Now, when orders from abroad are daily becoming fewer and farther between, and shipbuilding abroad is daily increasing, it seems advisable to call attention to this system of international giff-gaff as in all likelihood affording some partial reason of the gradual and steady cessation of foreign orders. It may not be generally known that in some countries where shipbuilding has for some time been carried on, under a system of national molly-coddling, funds are in existence for subsidising and encouraging the foreign learners in British shipyards and engine shops. So thoroughly is the working of the fund made subservient to the object in view, any foreign learner in our midst who may apply for benefit must accept it under stringent conditions as to his not remaining longer than a certain period in any one given yard or shop, but must peregrinate as much as possible from yard to yard, in the character, we suppose, of an itinerant picker-up of "unconsidered trifles." Some four years ago, it may be remembered, there was a threatened invasion of our shipbuilding and engineering works by six "young naval officers," acting under the orders of the Secretary of the United States Navy, the object being a course of special instruction in naval architecture preparatory to their appointment as assistant naval constructors. Whether or not these emissaries came, saw and conquered, is not within our

knowledge, but at all events it was felt at the time that the application made to European Governments, and to mercantile builders on the Clyde and elsewhere, for assistance towards this object was "a bit stiff." If the Americans, like other nations who patronise us, gave us orders to construct ships for them, the proposition that we should coach their young men for them might have been excusable, but when it is considered that the Yankees' acknowledged purpose was then, as it has all along been, to make "the States" thoroughly independent of British or European help, the request simply bordered on impertinence. There seems little room for doubt that the coaching and insight which the learners from other countries—sent by firms who also send orders—have all too freely bestowed upon them—are helping materially to the acquisition of the knowledge of "how it is done." In any case there has been for several years past an almost constant recall of the foreign "improvers" to appointments in their own countries, one of the latest instances of this being the transference of a foreign gentleman from one of the largest Clyde shipyards to the works conducted by Messrs. Belbino, Frederick & Co., Odessa, Russia. It may be denied that what these improvers and learners are privileged to see, or contrive to learn, is of much consequence; and that much of the information imparted is also obtainable from the Registry, rules and regulations, and from the drawings and data now so largely disseminated through the medium of the technical journals and societies. The fruits of the "improvers'" sojourn, however, are not alone to be measured by the information put in their way and acquired. The ties of intimacy sometimes contracted between them and home designers and skilled workers result not infrequently in the translation of highly experienced "hands," with bulky portfolios probably, to foreign situations. This is so particularly in the case of the United States, where the facilities for "translation" are not interfered with by any question of foreign language. It cannot of course be maintained that ship construction—ship design even—in these days is, in the old sense, a "secret" art or industry, the ins and outs of which are to be jealously guarded, or sold at a very high price; but between this untenable, not to say ridiculous, extreme and the lax way in which promises of "insight" to foreigners are dangled before the eyes of prospective foreign customers there is surely some more dignified and safer middle course. A fact of decided significance in this connection is that our Admiralty now discourages, if not absolutely prohibits, private firms who undertake Government work from employing foreign draughtsmen. In some recent cases known to us, foreigners who have been in the service of firms prior to their securing Government work have been paid off

immediately the contracts have been received. This positive attitude of our Admiralty authorities is certainly very different from that passively assumed by them only a few years ago, when the students from foreign lands and rival nations at Greenwich Naval College had the free run of, if not practical instruction in, the naval dockyards. Whether the more exclusive and reticent line of policy now followed by our Admiralty authorities is directly the outcome of the mysterious "translation" of plans about which a good deal was heard last year, or is simply the result of a general feeling that the exigencies of naval affairs impose more secrecy upon them, there seems to lurk in their present attitude a lesson which private mercantile shipbuilders might in some way profit by.

THE investigations and experiments set on foot by Mr. Yarrow, as to the vibrations set up by high-speed engines, and their effect upon light-framed torpedo-boats, has caused a large amount of attention to be given to this subject by various experts, and naturally the subject of vibrations resulting from the reciprocation of heavy masses and the irregularity of strains developed in engines has formed the subject matter of no less than three papers submitted to the Institution of Naval Architects, each author dealing with a special and distinct branch of the subject. Mr. H. Mallock deals analytically both mathematically and graphically with the determination of the direction and magnitude of the forces and couples which arise from the unbalanced moving parts of marine engines, and adds a few valuable remarks as to the determination by models of the actual period of vibration of any proposed ship when loaded in any given manner. He investigates mathematically the resultant force and couple of any engine, and shows graphically how to determine the amount and position of counterbalance weights to neutralise the disturbing couples and forces. Mr. Mark Robinson and Captain Sankey add to the ground covered by such investigation by a practical example of a serious alleged disturbance due to the vibration of ten high-speed engines felt and complained of at a distance of some 100 ft. or more away from the engines, though no vibration was sensible when standing close to the engines. The investigations ensuing disclosed two distinct and possible forms of disturbance to the foundations set up by the engines in question. One a tilting tendency due to an unbalanced couple, and the other a direct vertical up-and-down rise and depression. It was found that twice in a revolution—700 times a minute—a net lifting power of one ton acted upon the engine, and changed an equal number of times a minute into a depressing power of about 1·2 tons. This appeared

to be an ample cause of vibration, and was due solely to the effect (sometimes supposed to be negligible) of the connecting rods not being of infinite length, that is, that owing to the rocking action of any connecting rod of ordinary length, the movements of the pistons are not uniformly distributed in the first and second portions of the stroke. The authors finish their investigations by a description of a special designed pair of triple engines calculated to remove the effect both of the tilting and vertical vibrations. Herr Schlick, well known as an expert in vibration, completes the trio of vibration papers by investigations as to the laws of vibrations of the hulls of iron or steel vessels, vertical, horizontally, and torsionally, and points out the position of the modes of vibrations in a series of six orders of vibration. This gives a basis for naval architects if they have to deal with engines producing vibrations, as to where the engines would be best placed so that the vibrations set up should synchronise as little as possible with the period of vibration of the hull as a whole. It is a coincidence of these periods that produces the serious and distressing amount of vibrations throughout the hull of a high-speed steamer. It appears probable that what with engineers closely examining the means to prevent the development of unbalanced moments and stresses from the engines, and naval architects so determining the position of the engines that they shall produce the least effect, should vibrations exist, upon the hulls as a whole, we may soon find ourselves able to travel 20 to 25 knots an hour on the water without knowing that engines are revolving at high speed under us.

As the internal navigation of many countries on navigable rivers is largely on the increase, and each river requires vessels of different types, Mr. George Rickard desires to add to the reference data of the Institution of Naval Architects on such matters by information as to leading characteristics of boats suitable for the Volga, Amoor, Dnieper, and the Congo. He divides such boats into five types, the first for prospecting and exploration; the second to carry a small number of passengers; the third with regular cabin and saloon accommodation for passengers to carry cargo, and to be fitted for towing cargo barges; the fourth for employment on main rivers, to carry a great number of passengers and a considerable weight of cargo; and the fifth with luxurious dining and sleeping accommodation for a great number of passengers and a large quantity of cargo, with considerable fuel capacity for long distances, and up to a draught of 54 in. These are side paddle steamers. On the Congo and branches, he states the best results have been obtained from stern wheel boats, on

account of the large amount of floating timber, weeds, &c., met with in this river. The author then proceeds to give the considerations that are found most useful in guiding the construction and designs of the hulls for such river navigation, and gives a useful table of the chief dimensions of hull from 12 to 54 inches of draught. The paper as a whole is an excellent record of the ideas and practice at present in use for such special steamers as to which, hitherto, little seems to have been recorded.

ALUMINIUM is the new fashionable metal of the age for boat building. Mr. A. F. Yarrow considers that it is not improbable that aluminium and its light alloy may be available, by reduction of its price of production as a metal, for a large variety of boat building, and he therefore gives a detailed description of the experience of their firm in building an aluminium second-class torpedo-boat for the French Government. In a boat of this class lightness is of paramount importance, as such boats have to be stowed on deck, and weight is objectionable, both as regards the lifting tackle and the effect on the stability of the vessel as a deck load. The offer to build the boat of aluminium originated with Messrs. Yarrow & Co., and they were left an entirely free hand by the French Government. They used aluminium of 50 per cent. greater thickness than they would have used for steel, which reduced the weight one-half. They found it best eventually to use an alloy of aluminium with six per cent. of copper. This, rolled to a medium hardness gave 14 or 16 tons per square inch tensile strength with great toughness. Its greatest enemies are heat and alkalis; a film of oxide protects the metal from further action. As a result, the French Government were exceedingly pleased with the craft and will probably have more built.

#### A NEW PROCESS FOR SPRAYING PAINT.

MESSRS. A. C. WELLS & CO., of London and Manchester, whose "Wells' light" has been so widely successful, have recently turned their attention to machinery for spraying paint, and, in conjunction with Messrs. Henry Wallwork & Co., have now perfected the arrangement, which we illustrate. The advantages of any method whereby the slow and primitive hand-brush may be dispensed with are obvious. Prejudice, it is true, clings to hand work, and most modern labour-saving machinery has met with great opposition and the objection that the work, although more speedy, is not so thoroughly done as by the old-fashioned methods. But the hydraulic rivetter, the pneumatic caulker, the sand-blast, and countless other contrivances leave nothing to be

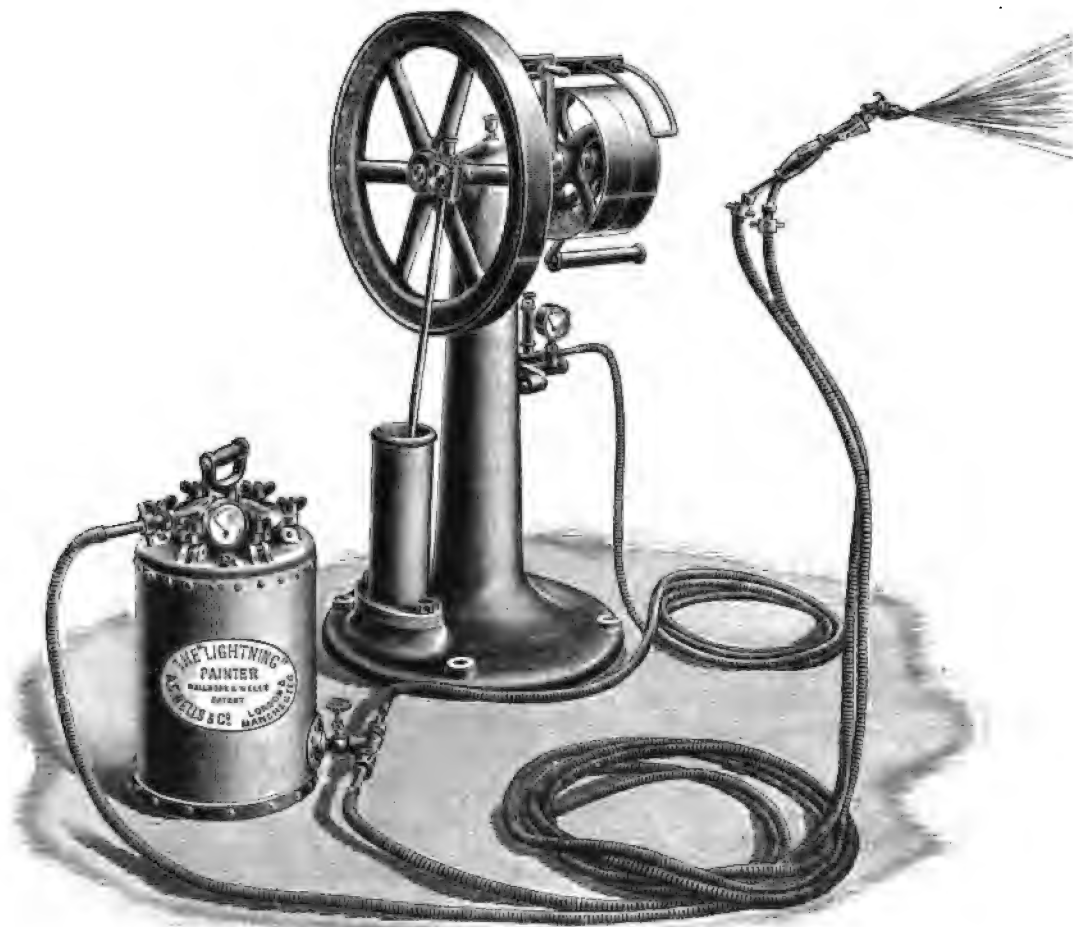
desired in the quality of work produced, while the output is increased to an almost incredible extent. Messrs. Wells claim that paint thrown on in a spray is more intimately in contact with the surface treated, covers it more evenly and smoothly, and penetrates into recesses and irregularities more thoroughly than if laid on by a brush, while the machine is from twice to four times as fast as the hand. From samples of work sent us by Messrs. Wells, their claim as to quality appears to be well-founded, the surfaces in question being smooth and even. In brush-work the marks of the brush can only be got rid of by repeated coats, while the samples before us, which have only received one coat from the sprayer, are perfectly smooth. The most important feature of the invention is, however, the speed at which the paint can be applied, this, of course, varying with the quality of surface required. Rough painting such as that in shipyards, bridge or girder yards, boiler-works, docks, &c., can be done at the rate of three cubic yards per minute, and an ordinary Lancashire boiler can be painted in less than an hour. In fact this machine is peculiarly adapted for use in shipbuilding yards, where large and comparatively rough surfaces have to be covered quickly during construction. In many yards pneumatic mains are led alongside the slips for working pneumatic caulking machines, and in some cases pneumatic riveters. Where this is so it is only necessary to couple the flexible hose to the nearest union and lead it to the paint container, which may be hoisted about the working scaffolds as desired, the further length of paint hose giving a large range of movement without shifting the container again. Where no air mains exist the compressor is fixed and driven by a belt in the nearest shop, the air being taken to the ship in wrought-iron pipes. Where the distance between the shop and ship is too great to make this course advisable, Messrs. Wells supply a neat portable steam engine and compressor with a vertical boiler on a wheeled carriage. For use in dry docks this steam engine is almost invariably required, as many docks have no machinery at all in their vicinity. One of the few processes for which the machine has been found unsuitable is that of coating ship bottoms with anti-fouling composition, as the composition—being mixed with spirits—is found to clog in the nozzle but for painting all above the boot the machine effects a great saving of time. Messrs. Wells have designed a nozzle with a handle some 6 ft. long, which is intended to take the place of the turk's-head brush commonly used for this class of work. The head of this nozzle is similar to that used with the ordinary plant, which is described in detail below, and needs no further illustration.

The method adopted to attain these results is by atomising the paint, and blowing it on to the work to be painted, by means of a stream of compressed air. The principle is simple, but the difficulty is found in its practical application. The smallness of the orifices, and their consequent liability to choke, the shape of the sprayer or injector, the tendency of paint to settle and deposit sediment, the necessity for simplicity and facility for cleaning in the apparatus, are some amongst the many points upon which the success of painting by machinery depends, and which have demanded much consideration and many ex-

periments on the part of the designers of the "Lightning," as it has been termed, Paint Sprayer.

Our illustration shows a complete painting-plant for use where no supply of compressed air is available. In many places the compressor shown can be dispensed with and air from pneumatic mains for riveters, &c., made use of. Air from the compressor, which is worked by power or hand for certain classes of work, or from the air main, is led by a flexible tube to the paint container shown in part section. This container has an airtight removable cover and holds a loose interchangeable pot containing the paint, which is a special feature, as it facilitates the cleaning

gauge and a handle for carrying. It is generally placed near the work while the compressor is of necessity fixed where power is available. The pressure of air required varies with the weight of paint and the speed and quality of work required. For engineer's work about 20 lbs. per square inch may be taken as about an average, while for some classes of cabinet work 5 lbs. is sufficient and may easily be obtained by hand power. Messrs. Wallwork & Wells make other forms of the machine; for small articles painted at the bench they put the paint in an overhead container, whence it drops by gravity into a dish and is sprayed downwards on to the work.



as well as the speedy change or renewal of paint. The paint is forced by the compressed air up an internal pipe, and along a second hose to the spraying nozzle where it is met by another stream of air direct from the compressor, and atomized. The correct proportions of the nozzle have been decided upon after much experiment and the liability to choke is overcome by an ingenious arrangement in the thumb valve on the nozzle which controls the paint supply. Should this become stopped an extreme movement can be given to it, whereby the small hole in the plug is reversed and the obstruction is blown out by a puff of compressed air. The paint container is fitted with an agitator or stirrer, a safety valve and pressure

Other special appliances have been designed for various purposes, and we understand that the system, although only very recently brought out, is already attracting considerable attention amongst all classes of engineers, as well as shipbuilders, cabinet-makers, house decorators, &c.

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Several slips have occurred in the banks of the Baltic Canal, but it is said ample precautions have been taken against any further slips. Experts are of opinion that the canal may, on the whole, be regarded as a complete success, though the curves at certain points west of the Levensau Bridge might have been avoided had the canal been begun later, in the light of subsequent experience.



**HOCKING'S PATENT EVAPORATOR.**

**W**ITHIN the last few years many forms of evaporators have been put upon the market, each vying with the other in efficiency, the main feature of difference being in the form and arrangement of the heating surfaces. We now have pleasure in bringing to the notice of our readers a new form of evaporator manufactured by Messrs. Hocking, Glascodine & Co., of 7, York Street, and 29 and 31, Henry Street, Liverpool. We illustrate this device in two views, Fig. 1 being a side elevation with the door and tubes removed from the interior for cleaning and inspection; and Fig. 2 being a front elevation of the device closed up ready for use.

The heating surface consists of a battery of straight solid-drawn copper tubes, brazed at each end into a series of inter-connecting castings, and arranged in independent sets, each of which can be detached from the door by removal of two external nuts, so that every part of the heating surface can be exposed to sight and touch with a facility and completeness unattainable in any arrangement of coils. The operation of opening, scaling, and closing up is so extremely simple that it may be done entirely by unskilled labour, and it is claimed that the arrangement of the

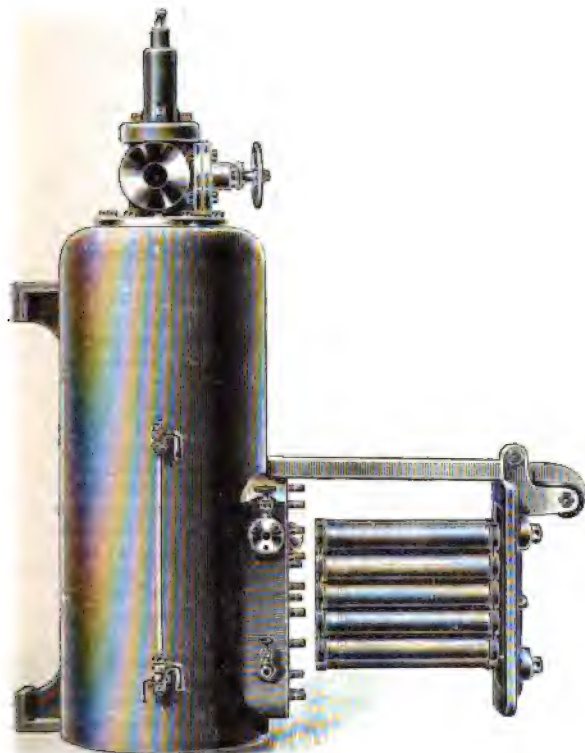


FIG. 1.

sets of tubes is so strong that it is practically impossible to damage them. There is only the one joint to break when opening up, and by the special arrangement of bearing rollers on the door, it is prevented from tipping with the weight of the tubes when drawn, and is rendered extremely easy to handle with perfect safety.

The makers, when so desired, supply with these evaporators a thoroughly reliable automatic feed-regulating device. An effective anti-priming arrangement is fitted to all evaporators, by which any water carried up with the vapour is returned below the level of the tubes.

We understand that Messrs. Hocking, Glascodine



FIG. 2.

& Co. have several orders on hand for these evaporators for Belfast and the Clyde, and that these devices have been most favourably received in many influential quarters.

**REMARKS ON STEAM PIPES.\***

By J. T. MILTON, Esq., MEMBER OF COUNCIL.

**T**HE importance of having reliable steam pipes on board-vessels cannot be overestimated. There have been a few cases where pipes have fractured with fatal results, which at the time drew attention to the subject; but minor accidents occur, and serious troubles with joints, &c., have to be faced, in which very little interest is taken. For instance, since the accident to the steam pipe of the *Elbe* in 1887, there have been fifteen casualties to the steam pipes of British-owned vessels which have been inquired into by the Board of Trade under the Explosions Act of 1882. A list of these cases is given at the end of the paper.

The object of the present paper is to bring forward some points of interest in connection with steam pipes, with the view of eliciting, in the discussion, the opinions of those who make and those who are responsible for the maintenance of these pipes as to the best material of which to make them, and the best means

\* Read at the Thirty-sixth Session of the Institution of Naval Architects.

to be adopted to provide for their special requirements in the way of expansion, draining, &c.

With regard to material, by far the greater number of steam pipes have been and are being made of copper, but of late wrought iron has in a few cases been used. Amongst the vessels fitted with wrought-iron pipes may be mentioned the *Campania* and *Lucania*. The following list, showing the names of some Liverpool ships in which cast-iron steam pipes (and cast-iron feed pipes) have been in use for many years, will probably be a surprise to some of the members of this Institution, as it was to me when the information was given to me three years ago by Mr. McGregor, my colleague in Liverpool:—

Name of Vessel.	Age of Steam Pipes. Years.	Name of Vessel.	Age of Steam Pipes. Years.
Africano ...	24	Macedonia ...	20
Agia Sofia ...	23	Nieta ...	22
Ararat ...	24	Nina ...	25
Arcadia ...	20	Palm ...	21
Bernard Hall ...	15	Plantain ...	16
Britannia ...	10	Roumelia ...	18
Laconia ...	7	*Andean ...	21
Lord Clive ...	11	*Australian ...	21
Lord Gough ...	16	*Haytian ...	19

The almost invariable use of copper for steam pipes for so many years has produced the general impression that it is the only suitable material. It, no doubt, was originally selected on account of its non-liability to corrosion, on one hand, and of its great ductility on the other. As regards corrosion, the almost invariable use of cast iron for stop-valve chests and safety-valve chests, as well as its frequent use for T pieces connecting copper steam pipes, and its invariable use for the slide chests and doors of the high-pressure cylinders, shows that cast iron, at any rate, can be used, without misgivings on this point, in parts which, like steam pipes, are always subjected to the full pressure of the steam, while the experience of the eighteen vessels previously mentioned also bears this out. The experience with *Campania* and *Lucania*, so far as it has gone, and also of several other large vessels in which they have been somewhat longer in use, shows that wrought-iron pipes also give no trouble in this respect. It was, therefore, no doubt, mainly owing to the ductility of copper that it obtained, and has since maintained, the preference over other materials for steam pipes.

Steam pipes have to withstand considerable changes of temperature, and their length is consequently liable to continual alterations. Their attachment to the engine may be liable to slight alteration in position, owing to the working or vibration of the engines or vessel; while those to the boilers are also liable to small displacements, due to the contraction or expansion of the boilers from variations of temperatures. All these changes are generally taken up or provided for by the deformation of easy bends in the pipes, or by expansion stuffing boxes where the pipes are straight.

It is evident that whatever forces are necessary to produce the deformation of a length of steam pipe necessary to allow for the expansion of the pipes, or for any possible working of the engines in the vessel, these forces have to be withstood by the necks of the stop valve chests or their attachments to the boilers and to the engines. In the case of pipes of small diameters and small thickness, if the bends are easy, a moderate force may be sufficient; but if the pipes are thicker, even if the diameters and the shapes of the bends are the same, the forces required to be borne by the attachments will increase in proportion to the thickness. The same thing holds good of the flange joints between the different lengths of pipe. These have to sustain the forces brought on the end attachments, and it might, therefore, very well happen that a design suitable for steam pressure of 60 lbs. may be altogether unfit for 180 lbs. solely on account of the greater thickness required making the pipes more rigid.

It must be remembered that the advance of engineering of late has not only increased the steam pressures used—and, therefore, the temperatures also—but engines are, in general, of much greater size and power than those used years ago. The steam pipes now, therefore, are, as a rule, larger in diameter, much thicker, and are subject to greater changes of temperature and expansion, &c., than formerly. These all make the pipes so

much stiffer, or more rigid, than with many pipes, even when made of copper, their rigidity is so great that their yielding or altering form cannot be relied upon to relieve expansion strains, which have, therefore, to be provided for in the same way as they would need to be if the pipes were made of cast iron.

Concurrently with the trouble of providing for expansion, &c. with thick and large pipes, there arises also a difficulty in manufacturing them. The usual method of making pipes of large diameter is to make them, both bends and straights, from copper sheets, the straights, except in very large pipes, having one seam along the entire length, the bends having two seams along the sides, the saddle and back pieces being each worked up from one sheet. The seams are invariably brazed, the edges of the copper being thinned down to form a scaph. Now, the difficulty of satisfactorily brazing a joint of this description increases rapidly with the thickness. The heat has necessarily to be applied from the outside, and has to pass through the thickness of the metal to reach the brazing solder, and thus the risk of overheating the copper on the outside, and consequently burning it, is much greater with thick than with fairly thin copper. There is also a further danger of deoxidising the copper, both in the brazing and also in the previous annealings to which the copper has to be subjected. To this further reference will presently be made.

All these considerations have made some of our prominent engineers look with disfavour upon copper as a material for large steam pipes, and to turn their attention to iron or steel.

Endeavours have been made to introduce seamless pipes of large size for these purposes to avoid the risk of brazing. These are made by several firms, and lately, I believe, with a certain amount of success; but amongst some of the earliest of those made some serious longitudinal defects, probably arising from a local defect in the original ingot being drawn out lengthwise in the manufacture of the pipe, causing them to be looked upon with a certain amount of suspicion; besides which the great difficulty of making satisfactory bends with these large pipes has no doubt had some influence in preventing their more general use.

While treating of bending copper pipes, it may be well to mention that the usual practice is to make bends from tubes one gauge thicker than straight pipes of the same diameter. This is, no doubt, correct practice, so long as the radius of the bend does not fall below a certain value, depending on the diameter and thickness of the pipes; but where sharp bends are made from bent tubes, a greater thickness ought to be provided. It is often assumed that in bending pipes the axis of the tube does not lengthen, and that the material of the saddle of the pipe becomes compressed to an amount about equal to the extension at the back of the bend. This is not the case. The compression of the material is not very great, and the pipe bends by extending not only at the back of the bend, but also along the sides; and if it be remembered that the thinning of the metal must be proportional to the extension, it will be found that one gauge thicker is in many cases scarcely sufficient to provide for this.

In Vol. II., page 431, of the *Transactions of the Iron and Steel Institution*, there is described a method by means of which seamless steel boiler tubes are made in Germany, and it is understood that a somewhat similar process is in use in this country for making seamless copper tubes. In some cases, however, these tubes are still made by repeated drawings from a cast pipe, in which case any original defect in the casting must produce a more serious defect in the finished tube.

The method of manufacturing the Elmore copper pipes has been publicly described, and it has been claimed that it renders the probability of their containing any latent defect very remote.

The following results of tests made by the Elmore Copper Co. upon two tubes made by themselves, and on one seamless tube and three brazed tubes which they procured from other makers will be of interest:—

It will be observed that the seamless drawn, and also the Elmore tubes, showed a high degree of strength, which indicated, that they were hard, or unannealed, a condition in which they would not be used in practice, as steam pipes are always left annealed, or very slightly hardened by planishing. To show the actual strengths of the copper in an annealed condition, twenty-eight test pieces were cut from these pipes and tested in an ordinary tensile testing machine, some of them being annealed, others unannealed. The results of these tests are given in Table II.

\* These vessels are now broken up or dismantled, but the cast-iron steam pipes were in use for the periods stated.

TABLE I.

Description of Pipe.	Diameter inside.	Thickness.	Pressure at which Pipe burst.	Stress in tons per sq. in. produced by this pressure.	Remarks.
	In.	In.	Lbs. per sq. in.		
Elmore Deposited.	12·039	·121	930	2·65	Pipe commenced to stretch at about 800 lbs. per square inch.
Ditto ...	9·05	·118	1100	18·8	Fractured at flange only.
Seamless Drawn ...	7·25	·125	1520	19·3	
Brazed ...	12·52	From ·104 to ·144	580	15·58	On thinnest section.
				12·56	On mean section.
Ditto ...	9·23	From ·125 to ·143	750	12·36	On thinnest section.
				11·27	On mean section.
Ditto ...	7·38	From ·116 to ·126	750	10·65	On thinnest section.
				10·00	On mean section.

NOTE.—All the brazed pipes burst by tearing at the edge of the brazing.

TABLE II.

SHOWING THE RESULTS OF TESTS OF STRIPS OF COPPER FROM THE SEAMLESS DRAWN, ELMORE DEPOSITED, AND BRAZED COPPER.

Dimensions of Test Piece.				Fractured Area.	Extension.	Stress at which Permanent Elongation was first observed.	Maximum Stress.	Remarks.
Length.	Breadth	Thickness.	Area.					

## TESTS FROM SEAMLESS DRAWN.

In.	In.	In.	Sq. in.	Sq. in.	Per cent.	Tons per sq. in.	Tons per sq. in.	
7½	1·496	·127	·190	·172	0·8	10·5	21·6	Not annealed.
"	1·494	·123	·184	·165	2·5	13·06	23·4	"
"	1·497	·125	·187	·151	19·8	4·4	14·7	Annealed.
"	1·495	·125	·187	·144	20·7	4·28	15·3	"

## TESTS FROM ELMORE DEPOSITED COPPER PIPE.

9	1·491	·118	·176	·094	22·9	2·39	21·1	Not annealed.
"	1·496	·113	·169	·082	25·6	2·25	21·2	"
"	1·493	·112	·167	·088	43·0	1·20	15·6	Annealed.
"	1·496	·115	·172	·092	43·0	3·00	15·1	"
"	1·496	·113	·169	·084	25·0	2·48	20·9	Not annealed.
"	1·496	·120	·179	·097	25·0	2·78	20·4	"
"	1·495	·117	·175	·084	43·0	1·49	15·5	Annealed.
"	1·495	·120	·179	·091	41·6	1·40	16·2	"
7½	1·495	·084	·126	·078	21·1	3·60	24·3	Not annealed.
"	1·499	·085	·127	·077	20·0	2·70	24·1	"
"	1·494	·085	·127	·068	43·5	2·90	16·5	Annealed.
"	1·498	·088	·132	·066	45·6	2·40	16·2	"

## TESTS FROM THE COPPER FROM WHICH THE BRAZED PIPES WERE MADE.

9	1·494	·135	·200	·178	19·4	3·90	17·4	Unannealed.
"	1·492	·133	·198	·124	29·8	5·90	17·8	"
7½	1·496	·121	·181	·141	28·9	4·14	16·5	"
9	1·495	·136	·200	·151	32·6	2·25	16·9	Annealed.
"	1·490	·135	·198	·117	39·8	4·10	17·2	"
7½	1·496	·123	·184	·137	31·8	3·80	15·5	"

## TESTS FROM BRAZED PIPES CUT ACROSS THE JOINTS.

9	1·488	·110	·164	·175	2·4	3·30	14·0	Unannealed.
"	1·490	·135	·200	·126	13·9	3·75	15·85	"
7½	1·492	·121	·180	·144	2·4	3·33	13·06	"
9	1·492	·112	·167	·163	2·8	2·09	14·10	"
"	1·490	·134	·199	·146	20·1	2·58	14·5	Annealed.
7½	1·496	·120	·179	·134	12·9	3·65	12·6	"

All but last test broke at edge of brazing. The last test broke partly at edge and partly through the brazing.

## MEAN RESULTS.

	Tensile Strength.	Tons per sq. in.	Extension per cent.
Elmore copper ... ..	Annealed.	15.85	43.3
Ditto ... ..	Unannealed.	22.0	23.3
Seamless Drawn ... ..	Annealed.	15.0	20.07
Ditto ... ..	Unannealed.	22.5	1.65
Ordinary Copper ... ..	Annealed.	16.53	34.4
Ditto ... ..	Unannealed.	17.23	26.0
Brazed Joint ... ..	Annealed.	13.55	—
Ditto ... ..	Unannealed.	14.10	—

From these tensile tests it will appear that Elmore copper even when hard has much extension, but that it commences to elongate at much less stress than annealed ordinary copper; while, when annealed, its behaviour as to ultimate strength and extension is very similar to that of good commercial copper, but it appears to commence to elongate at somewhat lower stresses than the latter.

While treating of copper pipes it may be well to say a few words as to the qualities of copper. Engineers generally purchase their copper sheets or tubes without subjecting them to rigid tests, relying upon the reputation of the makers for supplying a good article, and not troubling about the chemical composition, &c., so long as it is found to work well. In view of the great ductility of copper, the working of even an indifferent sample of copper may not be sufficient to detect its quality, especially when made into straight or nearly straight pipes.

Commercial copper is practically never pure, the amount of different impurities found in it being probably greater than in the case of any other metal commonly used. Information on this question can be found in the *Transactions of Mechanical Engineers*, No. 2, 1893, where two papers will be found on the subject, by Professor W. C. Roberts-Austen and Mr. Wm. Dean, respectively. An opinion is generally held by locomotive engineers, copper-smiths, and many others that the commercial copper of the present day, although chemically purer than that of years ago, is inferior in respect to its lasting qualities, both as regards ability to resist corrosive influences and also to withstand fatigue without cracking. Accordingly, for some purposes, what may be termed impurities are added to the copper for the purpose of improving some of its properties. The papers referred to, and the discussion on them appear to show that arsenic up to a proportion of  $\frac{1}{2}$  per cent. is certainly not injurious and is probably beneficial, improving both the tensile strength and ductility of the copper. On the other hand bismuth is objectionable, even

small quantities, such as .1 per cent., being sufficient to make the metal absolutely unreliable when heated above the boiling point of water. The following figures extracted from the paper by Professor Roberts-Austen, show these points.

Particulars are given in the preceding table for comparison of pure copper and of copper containing arsenic or bismuth; in all cases the copper being as cast, not hammered.

A small quantity of lead, say under .1 per cent., does not appear to be objectionable, but large quantities are not desirable; on the other hand, it appears that nickel and silver are not detrimental, the samples quoted by Mr. Dean as containing the largest proportions of these elements having given satisfactory results in use.

It is rather singular that in all copper made by smelting, oxygen is required in the copper to give ductility; the actual amount required in any case varies apparently with the proportions and amounts of the various impurities present. The precise amount needed is ascertained by frequent tests made during the "poling" process. If less than sufficient oxygen is present, the copper is called "over-poled," and is deficient in ductility, while if the oxygen is in excess, and the copper "dry," as it is termed, ductility also is lost. When the exact proportion is present the copper is termed "tough," or "tough pitch," and is ductile.

A point not generally appreciated by copper-smiths is, that copper of the proper "pitch," that is to say, containing the exact proportion of oxygen to give it its proper ductility, can be made to give up its oxygen and to become in fact "over-poled" by heating it in a reducing flame; that is, a flame not fully charged with oxygen. On the other hand, by heating it in an oxidising flame, it does not appear to absorb oxygen into the body of the material, the oxygen remaining on its surface, combined with some of the copper, in the form of oxide scale. If, therefore, copper is annealed or brazed, or worked in any way in a reducing flame, it loses its "pitch," and this cannot subsequently be regained by reheating in an oxidising flame. This matter was strongly impressed upon me by Dr. Watson, of the Broughton Copper Co., to whom I am indebted for much information on copper, and from experiments on this point I am of opinion that many of the so-called "burnings" of copper arise from heating in a reducing flame, rather than from overheating, or being raised to too high a temperature.

Inasmuch as the proportion of oxygen required to produce the proper "pitch" in copper varies according to the composition of the copper, the liability of its losing pitch during working will probably be much greater in some qualities of copper than in others.

It has been stated that the tensile strength and ductility of copper vary according to its composition, but with the same mixture of metal they vary very much more with the mechanical treatment it undergoes. If properly annealed its tensile strength is comparatively low, and its ductility is high. In comparing the qualities of copper, therefore, it is necessary to fix the standard as being thoroughly annealed. To show the effect of annealing and of work, the following tests recently made may be quoted. A copper tube was drawn in one operation from 3 w.g. to 11 w.g. (a very excessive draw, more than doubling its length). Its tensile strength when drawn was 24.38 tons per square inch, but its elongation was only 3.1 per cent. in 4 in. After annealing (or possibly only partially annealing) its tensile strength was 16.66 tons per square inch, and its elongation was 44 per cent. in 4 in. A good average result with annealed copper is 14 tons per square inch, and 40 to 45 per cent. elongation in 4 in. Some other illustrations of the effect of annealing on tensile strength, &c., are

	Temperature of Copper.	Tensile Strength per sq. in.	Percentage of Elongation.
	Deg. Fahr.	Lbs.	
Pure Copper ... ..	64	18,450	20
	64	19,740	35
Copper containing 1.2 per cent of arsenic ...	68	24,840	20
	206	20,470	16.6
	435	16,460	15
	511	14,340	4
	655	14,860	10
Copper containing 1.5 per cent of arsenic ...	59	26,460	20
	64	25,400	25 to 50
	241	23,460	26
	419	19,450	37
	500	18,360	Irregular.
	586	15,030	0
			Percentage of Elongation in 4 in.
Copper containing .1 per cent. of bismuth ...	59	18,020	20
	214	11,510	15
	324	5,620	0
	390	3,860	0
	525	4,940	0
	558	2,770	0

given in the results of the tests made by the Elmore Co., already quoted.

While treating on annealing it is interesting to compare the difference in the methods adopted in tube works and in ordinary copper-smiths' shops. In the former the tubes are annealed after every draw. They are raised to a temperature of from 800° to 900° C. say from 1,500° to 1,650° F., and are kept at that temperature for some little time, after which they are quenched in water.

The tubes are uniformly heated over their whole length, care being taken that the flame is clear and contains an excess of oxygen. In the copper-smith's shop, both sheets and pipes are heated over open coke fires; the flame may possibly be reducing, that is, may have a deficiency of oxygen, if the fire is a thick one. The sheet or pipe is moved about over the fire, spot after spot being heated, generally to a dull red, and after the whole surface has been thus treated the copper is either quenched or allowed to cool, and is considered to be annealed. It thus depends upon the workman's care and judgment to ensure that every part has been heated, and there is considerable probability that some small part may escape full heating. Further, the heating cannot be uniform, nor can any part in general be retained at the red heat for any considerable time, nor is the temperature at any part raised to the same degree as is usual in tube works.

The influence of time upon annealing has, so far as I know, not been much experimented upon, neither has that of the various impurities, but I am informed by Dr. Watson that annealing may be efficiently carried out at lower temperatures than 800° C., but that it requires longer time at the lower temperatures than at the higher.

To show the influence of temperature upon annealing the following experiments are deserving of notice. A sample of copper was found to be abnormal in its behaviour, being brittle instead of ductile. Its composition was as follows:—

Copper	...	...	...	99.693
Nickel	...	...	...	.260
Iron	...	...	...	.027
Arsenic	...	...	...	Trace
Silver	...	...	...	.020

100 000

Six test pieces were cut off it, one was tested unannealed, and five were annealed at different temperatures. The following were the results:—

Temperature at which annealing was performed.	Tensile strength tons per sq. in.	Extension per cent. in 4 in.	Fracture.
Unannealed	14.9	0.0	Granular.
Faintly visible red, about 525° C.	12.13	6.2	"
Dull red, about 700° C.	11.78	3.1	"
Cherry red, about 850° C.	13.89	4.7	"
Bright red, about 900° C.	14.2	14.0	Silky.
Approaching yellow, 1,000° C.	15.64	25.0	"

I am not able to say what caused the abnormal brittleness in this case, but after annealing at the high temperature the material regained a fair amount of ductility; and, after subsequent drawing or cold rolling, behaved in a perfectly normal manner. Annealing, however, at red heats left the material brittle. In this case very little time was allowed for annealing, the test pieces having been heated in an open fire and then quenched, the influence of time on annealing not having been so fully appreciated as it should have been.

The following figures, taken from page 310, Vol. II., 1894, of the *Transactions* of the Iron and Steel Institute, giving the temperatures corresponding with different visible appearances of heated metals are of interest:—

	Deg. Cent.	Deg. Fahr.
Incipient redness	525	977
Dull red	700	1,293
Cherry red	850	1,562
Bright red	950	1,742
Yellow	1,100	2,012
Incipient white	1,300	2,372
Bright white	1,500	2,732

That copper for large steam pipes is now being looked upon with some distrust is evidenced by the Admiralty having such pipes bound round with wire, whilst in mercantile practice some firms put iron bands round the pipes every few inches, and in some cases the pipes are lapped with fine steel wire ropes.

Turning our attention to other materials suitable for steam pipes, we find, practically only three, viz., cast iron, wrought iron, and mild steel.

Cast iron has the advantage that it can be made in any shape, straight or bent, and that tees or junctions can be made of it. On the other hand, if the pipes are of the same strength as wrought iron or steel, they are much heavier.

Wrought iron and steel may both be made with a lap-welded joint, but, whereas welds in iron are apparently looked upon as trustworthy after a severe hydraulic test, those in steel do not appear to have the same confidence reposed in them, as they generally have a riveted butt strap fitted over them. Apparently, therefore, iron pipes are preferable to steel, unless the latter are made seamless.

With pipes of either iron or steel, manufacturing conditions appear to require them to be of such a thickness that either has a very large margin of strength compared with the pressures now being used, or even with those higher pressures to which marine engineering appears to be tending, so that there is no advantage in this respect in using steel rather than iron.

The question of flanges for iron pipes is important. Most of those hitherto used have had forged iron flanges screwed on, riveted over on the face of the flange, but flanges are now being electrically welded to the pipes in some cases, and welded by machine hammers in others, these plans apparently giving sound results without the chance of leakage which screwed flanges might develop.

Regarding provision for expansion of pipes, whether of copper, iron, or steel, a point sometimes lost sight of is, that it is not sufficient to provide a flange joint in a straight length of pipe, but provision must also be made to anchor the ends of the length of pipe for the expansion of which provision has to be made, and so compel the movement of expansion to take place in the part provided for it, otherwise the end pressure on the pipes, amounting to several tons in all but the smallest pipes, will cause the joint to slide in the wrong direction. This has occasionally been overlooked in pipe designs. It is always difficult to provide for the expansion of large bends without producing excessive strains, so that, as far as possible, pipes should be made straight.

The only other point to which reference will be drawn is that of providing means of draining steam pipes. More than one fatal accident has been thought to be due to the presence of water in the pipes. In cases where it is the practice to always raise steam in all the boilers simultaneously, the stop valves on the boilers, if opened before steam is raised, may be the best possible drains for the pipes; but where there is more than one boiler in a vessel it may often happen that, even if all the boilers are invariably used for steaming purposes, one only may be used in port for auxiliary purposes, and in this case leakage from its main stop valve will find the steam pipes leading to the other boilers receptacles for the condensed steam, which, if not drained, may be dangerous when opening the stop-valves when raising steam in the other boilers. It is noteworthy that more than one of the serious accidents with pipes has occurred at the instant when stop-valves were being opened.

Too much attention cannot be paid to the provision for draining steam pipes, and it is considered that it is preferable that these should be automatic, or such as not to require personal attention.

## APPENDIX.

LIST OF CASES IN WHICH INQUIRIES HAVE BEEN HELD BY THE BOARD OF TRADE AS TO THE CAUSE OF CASUALTIES TO STEAM PIPES OF BRITISH VESSELS SINCE THE CASE OF THE *S.S. Elbe*, IN 1887:—

Name of Vessel.	Date of Casualty.	Casualty, Cause, &c.
Erin	1888	Wrought iron pipe connecting top of water-gauge to boiler corroded, and burst. This pipe was apparently twenty years old.



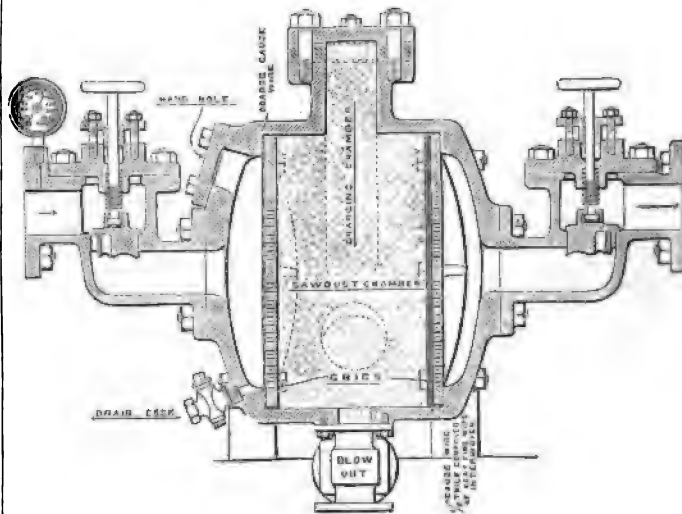
Name of Vessel.	Date of Casualty.	Casualty, Cause, &c.
Bryn Glas ...	1888	Intermediate stop-valve cover broke, attributed to the wheel for opening the valve being turned the wrong way.
Springbok ...	1890	Main steam pipe of copper—6 in. diameter, 3.16 in. thick—broke away from flange next the boiler stop-valve, due to faulty construction and to imperfect repairs.
Jumna... ..	1890	Main steam pipe of copper burst at the lap in a bent portion near the boiler stop-valve, probably due to defective workmanship in the original brazing.
Number Three	1891	5½ in. copper steam pipe burst at the brazed joint of the bend near throttle valve. The brazing was thought to be defective, and the accident was attributed to the presence of water in the pipe.
Greencastle ...	1891	Steam pipe broke at the flange joining throttle valve. An expansion joint was fitted, but it was not so arranged as to take the strain off the flange.
Rohilla... ..	1891	Copper pipe, 14 in. diameter, failed at the seam, which was riveted and brazed. Accident was attributed to an accumulation of water in the pipe.
City of Lincoln	1891	Copper pipe, 6½ in. diameter, cracked through the solid copper at the edge of brazed seam. Accident was attributed to the presence of water in the pipe, and to the existence of old flaws in the copper.
Shannon ...	1892	Branch steam pipe of copper, 8 in. diameter. Accident was attributed to the impact of water in the pipe, set in motion by the admission of steam from an auxiliary boiler.
Vulcan... ..	1892	Main steam pipe 6 in. diameter, failed at brazed seam after being in use five years. Probably due to the development of a latent defect, and possibly through want of sufficient provision for expansion, &c.
Grimsby ...	1892	Main steam pipe, 9 11-16 in. diameter, burst at a part adjacent to the brazed seam. Casualty was attributed to water in the pipe being set in motion when the stop-valve was opened.
Astrion ...	1892	Copper T-piece exploded at the junction of two 6 in. pipes with one of 9 in. Failure was attributed to the movement of the boilers and to the expansion joint having become set fast.
Viola ...	1892	Stop-valve box (cast iron) burst. Accident was attributed to the accumulation of water in the steam pipe, the draining arrangements having been allowed to get out of order.
Othello ...	1893	Small steam pipe, 1½ in. diameter burst by tearing away from the flange. Attributed to vibration of engines.
Astrakhan ...	1893	Winch steam pipe broke, due to water in the pipe being set in motion when steam was turned on.

**Contract for Four Russian Steamers.**—Messrs. William Dobson & Co. have just secured a good order for four Russian steamers and two steam barges.

**Spanish Gunboats.**—The Spanish Government have decided to order in Spain a number of gunboats, for which English builders were tendering. The English tenders were much lower, and offered earlier delivery than the Spanish.

## REEVES' PATENT FEED-WATER FILTERS.

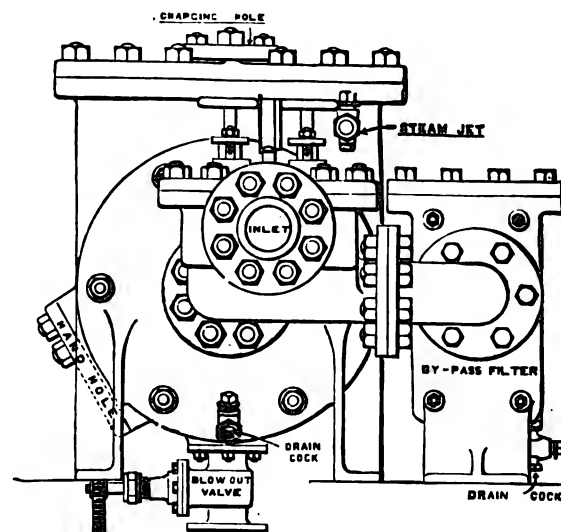
IT is well known that where condensed steam from the cylinders is utilized for return feed water to the boilers such feed water is apt to carry with it a large amount of grease and fatty matter, which will deposit on the boiler plates or tubes with other scale



and form a non-conducting coating on the heating surfaces which may lead to collapse.

Frequently, also, the only supply of fresh water that can be obtained may have a large quantity of earthy impurities in it which are equally disadvantageous to the heating surfaces of the boiler.

To prevent deposits and scaling chemicals are some-



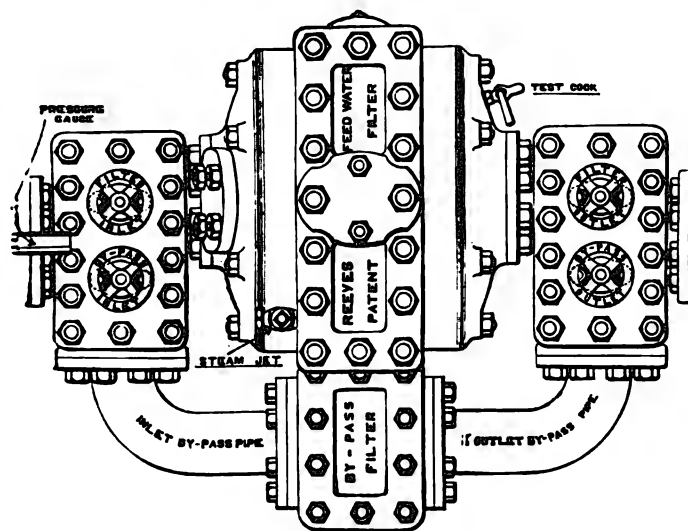
times used, but their effect upon the boiler plates may be disastrous, leading to corrosion and pitting.

There is no doubt then that the proper procedure for the feeding of the boiler is continual recharge from the condensed steam, which, when clear from impurities and grease, becomes actually distilled water of great purity.



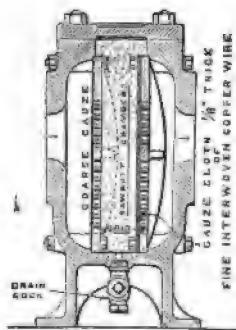
To remove all grease and impurities from such feed water a perfect filtration of the feed water is necessary, which shall always be reliable and in an apparatus easy of access for constant renewal of the filtering medium, which otherwise soon loses its efficiency and will clog the feed passage.

Reeves' Patent Feed-water Filter, which we illustrate herewith, and which is put on the market by the Reeves Patent Filters Co., Limited, of Albany



Buildings, 39, Victoria Street, Westminster, seems to be carefully adapted to fulfil these requirements.

The filtering medium employed in these filters is of the cheapest and most procurable material, viz., saw-dust. It is presented with an exceptionally large area and volume to the feed water, so as not in any way to obstruct its passage even if partially choked with dirt and grease, and when used in conjunction with fine gauze wire cloth



SECTIONAL VIEW OF BY-PASS FILTER

and enclosed between grids the sawdust has been found to act magnificently as an absorbent which effectually and permanently arrests and retains all grease and injurious suspended impurities contained in the feed water.

From the sectional view it will be seen that the sawdust can be, at any time, inserted into the body of a cast-iron box, or drum, where it is held in place by iron grids, one on each side, the face of the grids

meeting the flow of the feed water being further protected by coarse and fine wire gauze nettings. The large area and volume of the mass of sawdust, as compared with the area of the feed water inlet and outlet pipes, is very noticeable, and a great feature in the efficiency of the filter, a freshly-charged filter running fourteen days without attention or re-charging and doing good work during that period without setting up any resistance or pressure on the feed-pumps.

When dirty, the sawdust can be expelled "over-board" by opening a blow-out valve, and a fresh charge of sawdust can be poured in through the filling hole in the form of porridge.

Where large quantities of impure water have to be dealt with, gravity filters are used in combination with the Reeves filter, also where jet condensers are used.

It will be seen also that a miniature bye-pass filter is provided as an adjunct to the main filter, to provide for contingencies and for use when the main filter is being cleansed or re-charged, so as to ensure constant filtration at all times.

Hand-holes are provided to remove any dirt that may collect on the face of the first gauze nettings.

The principle adopted here of a large quantity of filtering medium of so cheap and common a character, that it may be obtained all over the world at a nominal cost, is a good one, as this should lead to constant discharge of the saturated medium and constant renewals, which is the essence of all perfect continuous work from any filter. The apparatus also is solid, well designed easy to be understood and handled on board ship, which are the qualities in all ship-going appliances that are most essential.

## AMALGAMATED SOCIETY OF ENGINEERS

THE above society, which is one of the most important trade unions in the country, has during the past month issued its forty-fourth Annual Report, and the General Secretary (Mr. John Anderson) in his introductory remarks, states that their society, like all other trade-unions, had severely suffered owing to the large amount paid for unemployed benefit during the past year, closely following upon two preceding years of bad trade. A large number of their members was for a considerable portion of the year compulsorily idle, owing to the protracted moulders' strike on the North-East Coast, the pattern makers' movement, and the Scotch miners' strike, for advances of wages. This combination of events, coupled with the severe depression, caused the unemployed list to rise seriously from April until August, when they had more unemployed members than had ever before been recorded. After October, however, the change had been in the direction of a steady decrease in the unemployed list, and this improvement had been, he might add, maintained until the present time. With regard to the progress of the society in a numerical point of view, this had been very satisfactory, nine new branches having been opened, and the membership having increased by 1,984, which brought the total number of branches up to 544, and the membership to 75,510 at the close of 1894. Turning to the financial operations of the society, they found that the income had again increased, so that it was the largest amount ever realised, the income for 1894 being £268,371 as against £265,214 in 1893. The expenditure for the year was £281,524, the heaviest item being out-of-work benefit, which stood at £188,976, representing an increase of £4,908 on the previous year, Sick benefit amounted to £41,824, superannuation to £55,482. Funeral benefit had been reduced from £12,976 in 1893 to £11,101 in 1894, but the contingent expenditure had gone up by £552, now reaching £2,488. The Benevolent fund amounted to £3,898, and the Accident benefit to £1,900, which was about the

ordinary average. They began the year with a balance of £185,854, but this had, with the end of 1894, decreased to £160,093, which although somewhat disheartening, was not so bad as might have been expected, owing to the decline in trade. With regard to the general policy of the society during the year, Mr. Anderson said the shipwrights *versus* fitters, payment for work on oil-tank steamers, overtime and apprentice questions, and Government and "Fair Wages" resolution, were the chief questions dealt with. With reference to all of them, the Council had pursued a cautious and painstaking policy, and in more than one case strikes had been avoided which might have been encouraged had the trade of the country warranted it, and he must beg the members to bear in mind that the restraint the Council

this question, he might say that whilst appreciating the protection of each trade within properly and reasonably defined limits, he entirely disapproved of filching and grasping. The oil-steamer question had, after some delay, been satisfactorily settled with the Ship Repairers' Association, and had been the means of laying down a system of discussion and conference that had produced good results. Their relationship with this Association was at the present time very satisfactory. The Fair Wages resolution had been on its trial in many instances during the past year, but the results were not so satisfactory as was desired. They must not, however, forget that such a departure in industrial economics as the drawing of a line at a fair wage for all Government and municipal workers was almost certain to

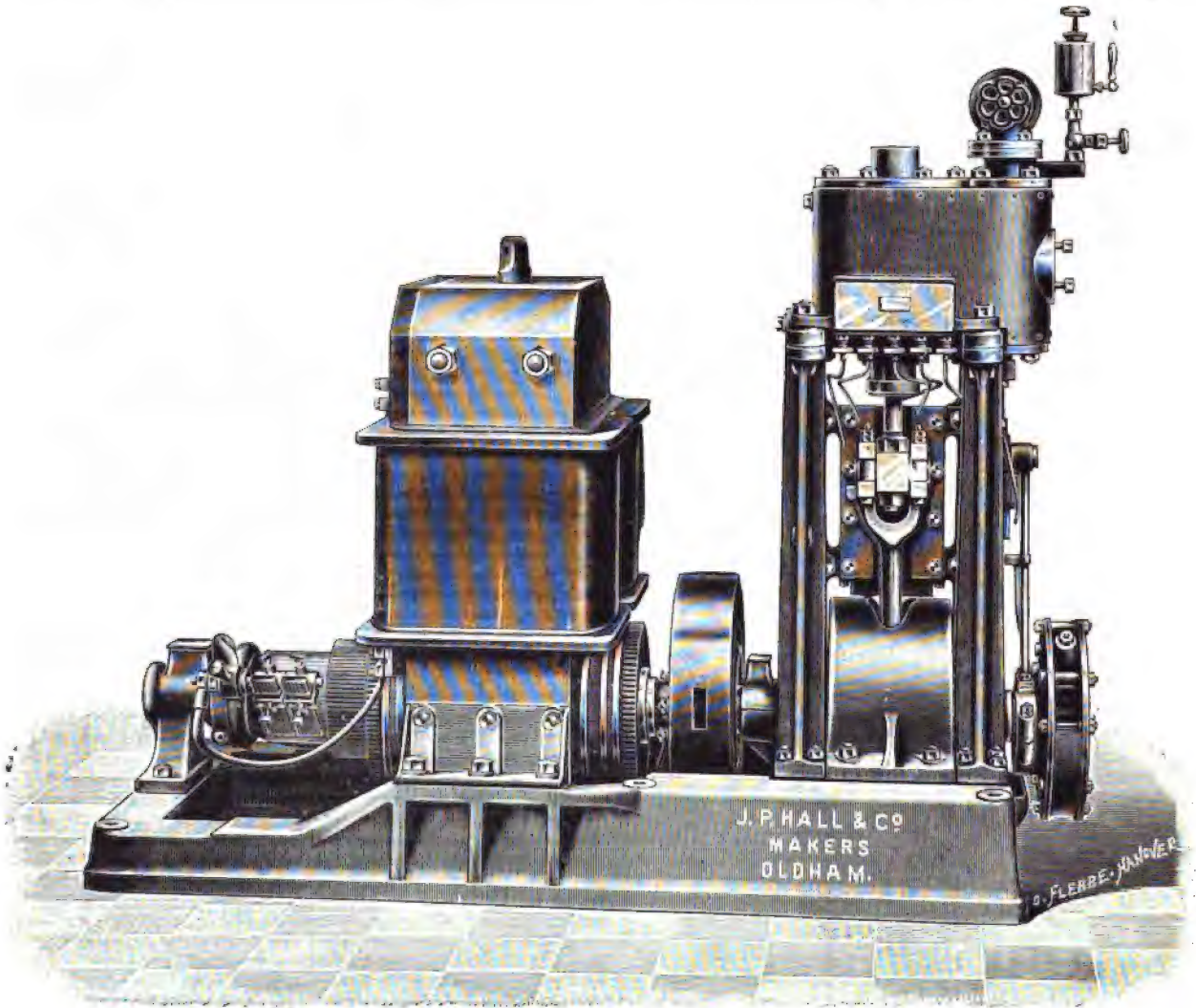


FIG. 1. COMBINED ENGINE AND DYNAMO.

had been compelled to use at times had not been for want of sympathy with them in their efforts to improve their position, but was due to an earnest desire to prevent disputes where their chances of success were doubtful. No satisfactory progress had been made on the apprentice question, but they could record several successes in the curtailment of overtime. Dealing with questions specially interesting to our readers, Mr. Anderson observes that the shipwrights' question had been one of very considerable importance, and had entailed a great deal of work, but he hoped they could now see something like a settlement in view, believing, as they did, that apart from the question of the royal dockyards, their relations with the Shipwrights' Society were of a very cordial nature, and he hoped that, however the matter might be settled, it would be done in a manner which would entail no hardship on the men of either trade. While on

require a large amount of careful adjustment, so that its object might be achieved without a general loss to the whole community. In conclusion, the Secretary offers a word of warning to the members with regard to the danger threatened by the internal dissensions and differences of opinion amongst the members of all the larger organisations, as to the future methods of dealing with social and industrial questions. While the Council entirely refrained from giving an opinion on them, or attempting to shape the opinions of their members, they must impress upon them the absolute necessity of maintaining harmony in their branch meetings, and they utterly deprecated any attempt to throttle the opinions of old, tried and trusted branch and district officials for the unjustifiable reason that they declined to forego the convictions of a lifetime for something that as yet was but imperfectly understood.

## COMBINED ENGINE AND DYNAMO.

WE illustrate in the adjoining diagrams a combined engine and dynamo, which is one of a pair recently constructed by Messrs. J. P. Hall & Co., Blackridings Ironworks, Oldham, and is one of a series of six sizes, ranging from 5 to 140 H.P., now manufactured by them. These engines are accurately balanced, the crank shafts being of forged steel with the balance weights forged on, and the material and workmanship throughout being of the highest quality.

The engine illustrated gives 18 I.H.P. when running at 250 revolutions per minute, with a steam pressure of 80 lbs. The dynamo is of the usual direct type made by this firm, and is compound wound, giving at the speed stated, 150 amperes at 65 volts.

The armature is of the drum bar type, the driving power being transmitted to the winding by means of strong flat driving pegs let into the core, which is positively driven through keys let into the shaft.

The insulation is of the highest quality and largely

O, pivotted and free to revolve in the discs F and G. The compression of the springs can be adjusted to balance the centrifugal action of the weights within a certain variation of speed by means of the locknuts S S. The flexible bar which replaces the numerous connecting rods, pins and joints hitherto used, is on the outside of the disc F, and taken on to the studs J J, on the weights. These studs pass through slots in the disc, Fig. 4. At the centre of the bar is a forged eye that embraces a stud T on the eccentric B.

The eccentric, which has a large eye to enable it to move relatively to the shaft, has an extended ear pivotted to the disc at E. When the weights I I move in or out, owing to variations in the speed of the engine, the flexible bar K shifts the eccentric to vary the cut-off. At the minimum travel of the valve, the port is only opened by the amount of the lead, and at all other cut-offs the lead remains the same. The governor can be used for either right or left hand by reversing the position of the parts. It is exceedingly compact and powerful and, we understand, works

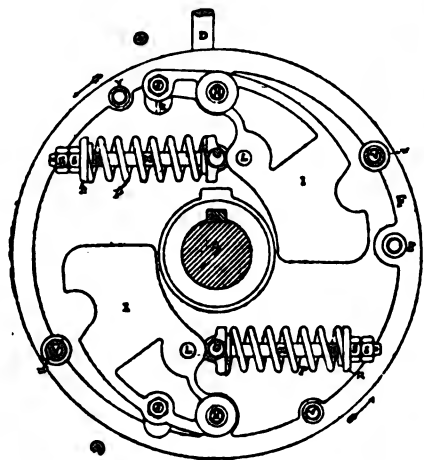


FIG. 2.

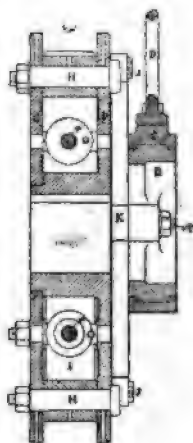


FIG. 3.

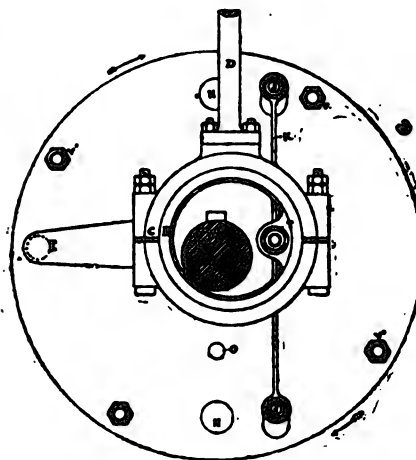


FIG. 4.

consists of mica. The commutator contains 91 segments of hard-drawn copper, each being  $1\frac{1}{2}$  inches deep. The current density in the armature conductors is below 1,000 amperes per square inch of section, and the rise in temperature does not exceed 70 deg. Fahr. after a 10 hours' run with full load.

The engine is fitted with Messrs. Hall & Co's new patent automatic expansion gear, details of which we illustrate in Figs. 2, 3 and 4. This gear, we understand, gives extreme regularity of speed throughout the entire range of power of the engine. It will be seen that the governor disc is in two parts; the part F is keyed to the shaft, while a part G (Fig. 3) is an annulus connected by bolts and distance pieces V to F, leaving an intermediate space in which are contained the weights I I and the springs M M, as shown in Fig. 2, which represents the disc G removed to display weights and springs. The weights are pivotted at H H, the upper one being provided with a tailpiece so that the two weights can be connected together by a flexible bar K. Each weight has connected to it by a stud L, an eye bolt round which is coiled the helical spring M. The eye bolt passes through a swivel lug

exceptionally easy, there being hardly any friction, and, as will be seen from the construction, should run for a long time without attention or developing slack joints.

THE NEW CHANNEL STEAMER  
"WICKLOW."

THE City of Dublin Steam Packet Co., which claims the distinction of being the oldest steamship company in existence, and whose excellent service of steamers for both passenger and cargo carrying, between the Irish capital and the port of Liverpool, has been maintained for the past 56 years, have within recent years evinced much enterprise in adding to their fleet vessels of a thoroughly up-to-date character. Five years ago they entrusted to Messrs. Blackwood & Gordon, of Port-Glasgow, the building of a powerful paddle steamer, the *Galway*, which has ever since been doing excellent service. Last year the company made a still further addition to their fleet; in this case departing from their time-honoured and invariable rule of employing paddle-wheel propulsion and going in for a screw-propelled vessel. The builders again selected for the production of this, their first screw steamer, were Messrs. Blackwood & Gordon, and the result was the *s.s. Louth*, handed over to the company in August last year.

This vessel has been flying constantly since, doing the work



required of her in a way so efficient—even during the abnormally trying severity of last winter—that the company have on several occasions openly complimented the builders on the vessel's sea-going qualities and speed. Not only so, but some six months ago they gave the best and most tangible proof of their satisfaction with the *Louth* by ordering from Messrs. Blackwood & Gordon a similar, or but slightly altered, vessel. This steamer, the *Wicklow*, has just been handed over to the company after undergoing systematic and exhaustive tests of her speed, steaming powers, coal consumption and steering efficiency, all of which have proved entirely satisfactory to the company's representative. The *Louth*, it may be stated, during the seven months she has been on the service between Dublin and Liverpool, has made the passage on an average in eight hours. The distance being 120 knots, this gives an average working speed of 15 knots an hour.

Difficult as it might appear to have been to improve on the *Louth*, there seems to be good reason for anticipating that, in the case of the *Wicklow*, the company have been provided with even a better boat. On the measured mile at Skelmorlie, this latest vessel made, in the partially loaded condition, a speed of 15½ knots per hour. Fully loaded, and proceeding for the greater part in the teeth of stiff, northerly breezes, on the Firth of Clyde, on the 16th ult., the *Wicklow* steamed for over 6 hours, averaging during the period a speed of 14.92 knots. In this connection it should be stated that the propeller fitted on the *Wicklow* is of Stone's bronze, a material growing in favour for propellers in Clyde marine engineering practice as elsewhere, and for which an augmentation in speed in the vessels fitted with it can justly be claimed. The principal dimensions of the *Wicklow* are:—Length, 260 ft.; breadth, 34 ft.; depth, 18 ft. 9 in.; while she registers 1,250 tons gross. The engines, which have been constructed by the builders, are of the triple-expansion type of 2,750 I.H.P. Steam is supplied from two cylindrical boilers at 160 lbs. working pressure, and amongst the numerous accessories fitted are the "Harris" patent feed-water filter, Watts patent automatic boiler circulator and deposit extractor, and Aspinall's patent governor, fully described and illustrated by us in our June number last year.

The *Wicklow* has main and 'tween decks and poop bridge and forecabin. She has seven watertight bulkheads, and her bottom is fitted with double bottom for 120 tons water ballast. The hull and all deck and other fittings are exceptionally strong construction, and adapted for the heaviest demands of the intended service. Accommodation is provided for 71 first-class passengers. The saloon is luxuriously appointed, being upholstered in ruby velvet, while the panelling is of carved oak, walnut and other woods, with hardwood trusses and mouldings. Opening from the saloon are the state-rooms, handsomely appointed, and admirable alike for spaciousness, light and ventilation. Amidships is a spacious cabin for the accommodation of cattle dealers, who have at their disposal a comfortable cabin, fitted with roomy bunks and other conveniences. In this cabin there are 32 berths. The accommodation for steerage passengers is in the forward part of the vessel, and 460 passengers of this class can be conveyed. The deck is spacious, while below there is excellent shelter against heavy weather.

Throughout the vessel are fitted all the modern and approved appliances for the general working both of the ship and cargo. The steam windlass is by Clarke, Chapman & Co., Newcastle, and the steam winches by Messrs. Wilson & Sons, Sandhills, Birkenhead, at each of the cargo hatches. Steam steering gear of the "Harrison" patent type is fitted in the deckhouse at front of bridge deck, and can be worked either within the house or from a handwheel on the navigating bridge above. The rods and chains connecting with the quadrant at rudder-head are specially strong, and near the latter are fitted steering rod springs of strong make, designed to take the force of any sudden shock sustained by the rudder from off the steering rods. Electric lighting is general throughout the ship, in cabin, berths and holds, the installation having been fitted by Messrs. Siemens Brothers, the engine driving the dynamo being by Messrs. W. H. Allen & Co. Electric bells have been placed for the convenience of passengers all over the vessel. The lifeboats, which were built by Mr. Robert Rodger, Port-Glasgow, are fitted with Clifford's patent lowering apparatus, in conformity with Admiralty requirements in event of the ship carrying troops.

One of the most important features of this steamer is the excellent accommodation for the conveyance of cattle. The fittings are arranged in accordance with the regulations as issued by the new Order in Council, which came into force at the

beginning of the past month. In the 'tween decks four tiers of animals can be carried. The lower hold forward is also appropriated for cattle carrying, the whole of the arrangements being well considered, and carried out with every regard to the preservation and care of cattle in transit. In this hold and 'tween decks the atmosphere is kept pure by the method of induced currents, the inducing current being supplied through nozzles from a special engine made by the Anderston Foundry Co. This artificial ventilation, although very complete, is looked upon as an auxiliary only, for special circumstances, very large up cast and down cast ventilators (with copper cowls) being supplied sufficient to give thorough ventilation under ordinary circumstances.

On the occasion of the official trial on the 16th ult., the results of which have already been stated, there was on board, besides a goodly company of local ladies and gentlemen, Mr. William Watson, managing director, Captain Bell, marine superintendent, and Mr. E. J. Ferber, superintendent engineer; City of Dublin Steam Packet Co.; Mr. McGeoch, Mr. Parvis, and Mr. Wallace, of the firm of builders; Messrs. George Turnbull, William MacConnell, and William Laing, of the Glasgow and Londonderry Steam Packet Co.; Mr. A. D. Wedgewood, Dennystown Forge Co., Dumbarton; Mr. F. Gross, of Messrs. John Brown & Co., Sheffield; Mr. John Neilson (Messrs. Neilson Bros.); Mr. David Pollock and Mr. C. R. Stewart, Glasgow. Mr. McGeoch, who presided at the dinner served in the saloon during the trial, after referring to the *Wicklow's* performances and those of her elder sister the *Louth*, said this was the third vessel they had built for the City of Dublin Steam Packet Co., and he hoped it would not be long until they had a fourth. The company have had the privilege of carrying Her Majesty's mails for 56 years. There is a new mail contract about to be entered into, and the Government are at present considering the question. It was intended that the journey between Holyhead and Kingstown would be lessened. The Irish people, he felt sure, would wish that this contract be placed with a company of their own nation, namely, the City of Dublin Steam Packet Co., who had served them so well and faithfully in the past. Mr. William Watson, managing director of the company, who replied, expressed himself highly satisfied with the performances of the *Wicklow*. In every detail the *Wicklow* is satisfactory, and he complimented the builders on the way they had carried out the orders of the company. Reference had been made by the chairman to the company's mail service. He might say that they had had the privilege of carrying the mails for the past 56 years. They are now negotiating for a new contract, and it would be no fault of theirs if they did not get it. They would endeavour to obtain the contract, and if they were successful they would carry it out satisfactorily.

### THE INCANDESCENT PARAFFIN LAMP.

WE have had the opportunity of inspecting a novel form of paraffin lamp, which has certainly valid claims for advantages which do not obtain with the means for lighting at present in use. This lamp—an outside view of which we illustrate in the adjoining diagram—produces without any wick, a splendid soft light, much clearer than gas, which is equal in lighting power to the electric arc lamp. The upper part of the lamp carries an oil reservoir, from which the oil is led down to the burner, through a vaporising coil. This coil is heated by the waste heat from the flame. The burner is circular, and is very similar in form to the Wenham gas burner. The oil in a vaporised condition is allowed to issue from the orifices of the burner, and when lighted forms a ring of flame. A special starting device is fitted to the lamp to heat up the parts ready for starting the lighting device proper. The flame is protected by a globe, which latter can be lowered in order to apply a light to the burner for lighting it. As to the efficiency of the lamp as a lighting device, we understand that it

has been examined by the "Physico-Technical Government Institute of Germany." In a report issued by this Institute it is stated that "the petroleum lamp has been examined with a photometer," with the result that "with a reflection at an angle of 45 degrees from the horizon, a lighting capacity of 140 candles, with a consumption of petroleum of 164 grammes per hour, is given off."

Taking now the 140 candle-power lamp as running for 50 hours with petroleum at 6d. per gallon, the cost for this time would be 1s. 2½d. With gas at 3s. per thousand cubic feet, the cost of the same amount of illumination would be 7s. with ordinary fish-tail



burners. Taking electric current at 8d. per unit, the cost of lighting by electricity would be 19s. 5d. From these figures it will be seen that the Petroleum Incandescent Lamp only costs from a quarter to one-fifth the cost of gas and about one-nineteenth the cost of electric light. So that the new lamp appears, from the above data, to be a long way ahead of the usual systems of lighting. With regard to ordinary petroleum lamps with a wick, we understand that the incandescent lamp will give about double the light of a wick lamp with about half the consumption of oil, roughly about four to one in the matter of efficiency. It is said that the lamp is perfectly safe and cannot explode, and either Russian or American oil can be used.

The lamp is simply constructed, and being without complicated parts the lamp can be kept in perfect working order by anybody. When arranged for outside use, the lamp is fitted with a storm-proof guard to protect it against the effect of the wind.

These lamps can be seen at 73, Queen Victoria Street, London, E.C.

### METALLIC GLAND PACKING.

MR. JAMES AIREY, of West Hartlepool, read a paper on the above subject, with particular reference to the Mudd & Airey patent packing, before the Marine Engineers' Institute at West Hartlepool, on April 23rd, of which we give an extract, as follows:—

A great engineer once remarked, "You will never have a perfect steam engine till you can make one without glands." There was more keen insight in this remark than appears on the surface, because it showed he had at an early period become fully aware of the fact so often overlooked, that a very large proportion of the internal resistances of an engine consist of the resistance produced by the packing in the stuffing boxes to the motion of the rods.

One of the great fields open to the engineer in which he may delve with a view to unearthing improvements in the steam engine, is the efficiency of the mechanism as distinct from the efficiency of the steam, the efficiency of the boiler, or the efficiency of the propeller (regarded as a separate instrument from the engine).

Of this enticing field, viz., the efficiency of the mechanism, there is perhaps no more fertile spot than that which yields reduction of friction. In recent years the frictional losses in marine engines have been reduced in many directions, partly by mechanism better adapted to its purpose, and partly by the adoption of more suitable qualities of bearing metals, but in no part of the engine where friction must necessarily exist to some extent has the friction, in all probability, been reduced to the same extent as it is possible to reduce it by the adoption of a good type of metallic gland packing, when compared with the older forms of packing.

A gland packing, however, that will run with little friction, has in a very important degree the further useful property of consequently reducing wear. This is of course the same in all cases where friction is reduced, such as in cylinders, which, by means of a steamtight but very frictionless packing in the pistons, can be made to retain their parallelism and circularity over long periods; and in main bearings, which with suitable bearing areas and qualities of bearing metals, can be made to run for years without letting the shaft get out of line, and almost without showing wear at all. With the piston rods the absence of wear is important, because when wear exists ridges are formed top and bottom, which ridges naturally terminate, in a tapering fashion, and these tapers act as wedges on the packing at the top and bottom of the stroke. Also the rods, when wear goes on, do not retain their circular form, nor their parallelism, and it becomes necessary to take them out to be trued up in the lathe, which again readily reduces them below the strength necessary in a part of the engine through which the full pressure of steam is transmitted to the other working parts.

If, therefore, a packing can be designed that will at once permit a large amount of power to be transmitted to the propeller which has hitherto been lost in thrusting the rods to and fro through the packing, and preserve the rods and spindles from wear, with all the unpleasant consequences which follow thereupon, it is obvious that such a thing is highly to be desired and is worth a great effort to make it a success.

Some four years ago the writer of this paper, together with another, attempted to secure a satisfactory steam-tightness of the glands by means of a packing based in its design upon the principles which had rendered Mr. Mudd's patent piston packing so eminent a success for some years previous thereto. The principle, simply stated, is that of avoiding everything in the shape of a bevil or wedge and applying vertical and tangential spring pressures independently of each other, so that each might be adjusted to suit its own purpose.

A large number of stuffing boxes have now been fitted with the packing, and it has been found that as much as 50 H.P. had

in some instances been relieved and become available for driving the ship by the packing of one high pressure rod, which had previously been expended on forcing the rod through the ordinary packing. It has also been found, in an experience extending to nearly four years, that there is an almost imperceptible wear on the rods by this system of packing, and this is just such a result as would be looked for with so considerable a reduction of friction as the indicator cards show.

Some indicator diagrams were exhibited, taken from a local vessel engined at the Central Engine Works, and when they were taken the vessel was steaming  $9\frac{1}{2}$  knots, carrying 2,770 tons deadweight, on a consumption of 9.4 tons of Welsh coal per 24 hours. She is fitted with this metallic gland packing in all the piston rods and spindles.

The writer of the paper concluded by reading a dozen very favourable reports selected from a large number received from vessels fitted with the patent gland packing referred to, and an interesting discussion followed, in which Mr. J. R. Fothergill, Mr. Kennedy, Mr. Dobson and others took part.

### HOLEHOUSE & MORLEY'S DUPLEX STEAM PUMP.

WE illustrate in the adjoining diagrams a vertical duplex steam pump which is adapted for working expansively. Fig. 1 is a perspective view of the pump, Fig. 2 is a part sectional view showing the valve mechanism, and Fig. 3 is a plan of the same. It will be seen from the illustration that the valve of each engine is partly controlled by its own piston and partly by the piston of the other engine. The valve of one engine is opened by the other engine, but is closed by its own piston. To carry this into effect, each valve spindle is operated by a rocking lever driven by a crosshead on the piston rod. This lever is not mounted upon the ordinary fixed stud, but arranged to rock upon a stud situated at the end of a lever attached to a rocking shaft which is operated by the opposite engine. The valve spindle is adapted to be turned round by hand in order to alter the amount of dead play of the spindle in relation to the valve to a more or less extent according to whatever degree the steam is to be used expansively.

The expansion can be varied, whilst the pump is in motion, to cut off steam at any portion of the stroke from 7-12ths to full stroke, and by giving the slide valves inside lap the pistons will not strike the covers if the water fails or a pipe breaks. We understand that pumps have been run at an enormous speed, which it was impossible to count without special appliances, and the suction pipe has been loosed off from the pump without the pistons striking the covers. Inside lap will as a matter of course give excessive back pressure.

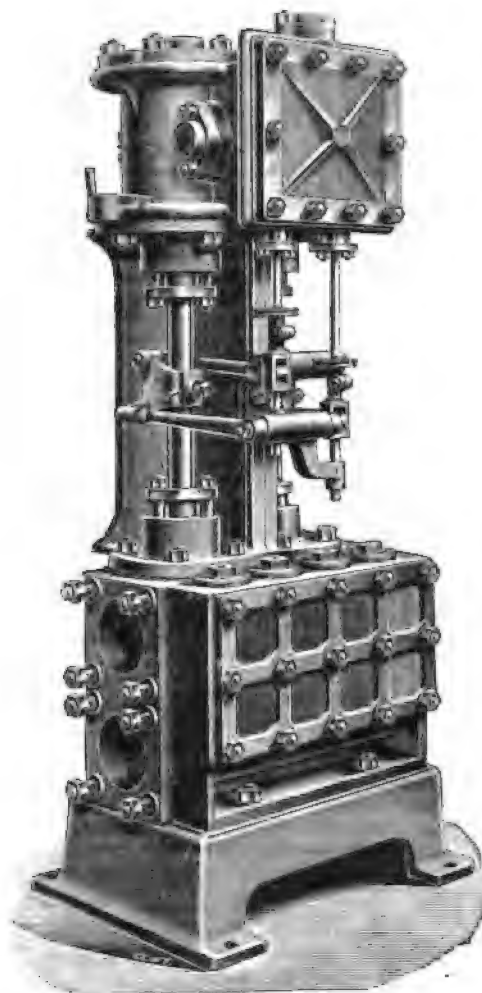
In actual practice inside lap is not given, as up to about 400 ft. piston speed it is found not to be required, as the inter-relation of the pistons and valves of the two sets of steam and water parts permits of an automatic compensating action.

It is also found that a long suction and fairly long delivery pipes add to the smooth working of the pump, the water in motion acting as a fly wheel to the pump, making this pump especially suited for petroleum vessels, &c.

The pump makes no short strokes, and with the variable expansion gear the strokes can be adjusted to suit the load whilst the pump is in motion. For instance, suppose a pump is required to work against

several different heads, say one head to equal 100 ft. and another head of 20 ft. For the 100 ft. head the steam would be required to act upon the piston for a long period of the stroke, and the speed would be slow, whilst for the 20 ft. head the expansion is altered to an early cut-off by simply twisting the small hand wheels on the valve spindles, the speed of the pump increasing four or five times. In both cases the full length of the stroke is maintained, and providing the water pipes and valves are large enough the pump works more quietly as the speed increases.

When working expansively the pistons follow each



other like pistons controlled with cranks at right angles without the disadvantages of the circular motion. The circular motion changes the speed of the pistons four times in each revolution, which causes all rotary pumps to knock or pound by the overrunning of the water on to the piston.

The straight line motion, with its instantaneous reversion, has practically no variation of speed, consequently the speed of the water is constant, and there is no time for the mass of the water to act upon the valves, with the result that there is little or no wear on the valves when working under these conditions.

The effect of late expansion tends to destroy the half



stroke position of the pistons, as not being rigidly connected they can approach towards and recede from that relative position, but it does not prevent both pistons working at the same time, thus making this pump twice the capacity of the ordinary duplex pump working at the same piston speed.

speed) is 75 per cent. greater. In pumps made especially for boiler-feeding and hydraulic work, all lap is taken off the slide valve, and the hand-wheels are abolished, so that no alteration can be made, as it is absolutely requisite in these cases, especially for hydraulic work in shipyards, &c., where accumulators

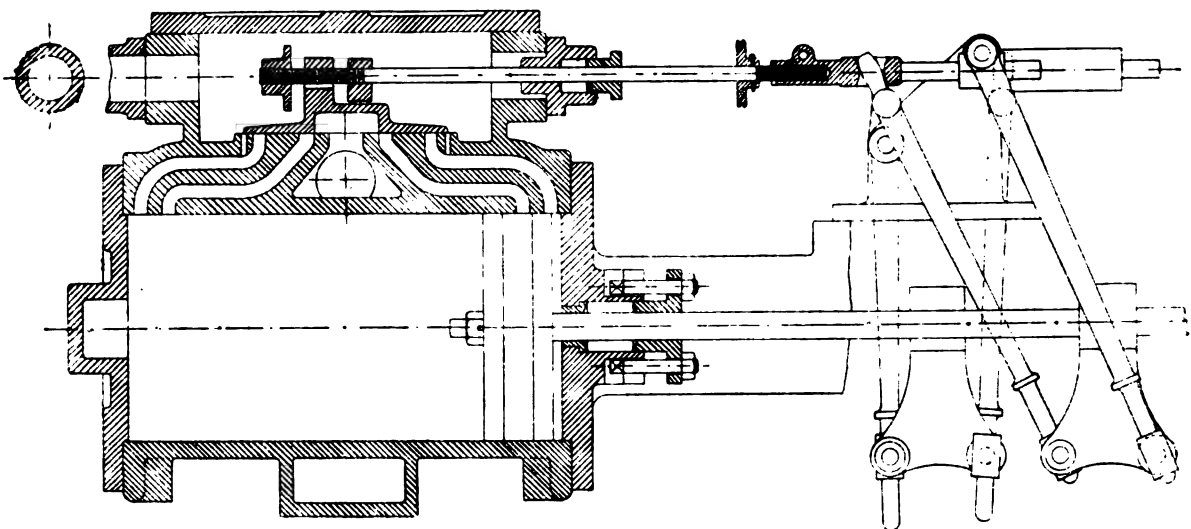


FIG. 2.

The ordinary duplex pump practically stands still one-half its time, and has only the capacity of a single pump, so that when pumping against an accumulator or against a hydraulic lift, each stroke of the pump is felt like a blow. The continuous flow of the Holehouse & Morley pump gets over this difficulty.

When working expansively the two pistons keep an exact juxtaposition, viz.: half stroke, or precisely as though they were coupled together with cranks at right angles; when working in this position the hand-wheel, which is fast on the valve spindle, is turned round until the space between the hand wheel and the shoulder on the spindle is closed up, and the spaces between the bridle and the valve are also closed, the valve being rigidly held to the spindle, the spindle having compound screws for this purpose, the outside thread being one-half the pitch of the thread shown in the steam chest.

In this position the pump runs at high speeds, the cushion at the end of the stroke being quietly effected, the reversion of the piston being instantaneous. The direct effect of this is that the water is kept in one constant motion acting by its momentum, acting the part of a fly-wheel to an ordinary engine, whilst the straight line motion of the piston enables a higher speed to be run than can be got by a rotary motion.

To work slowly the hand-wheel is turned back to the position shown in Fig. 2, by which it will be perceived the valve has some amount of lost motion or slack action, and steam is carried the full length of stroke; this causes the half-stroke position to be disturbed somewhat, and gives a pause at the end of the stroke, but not nearly so long a pause as obtains in other duplex pumps. The pause being shorter or approximately 75 per cent. less than other pumps, the capacity of the pumps (at the same actual piston

are used, that the pressure should be free from jerk or jar. The ordinary duplex pump causes a vibration, owing to a sudden stroke and stoppage; whilst these pumps, on account of both pistons working together,

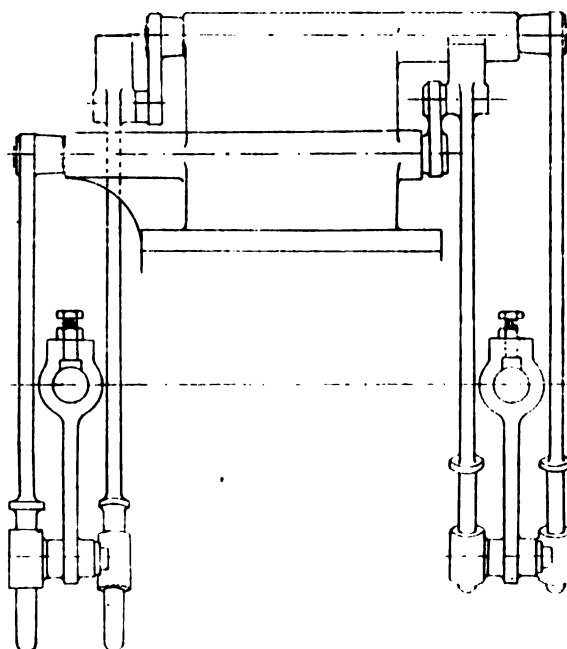


FIG. 3.

give a regular and easy motion. The compound motion does away with all short strokes, the ordinary pump slide valve is actuated solely from its fellow pump, keeping steam on one piston whilst standing

still until its fellow pump reverses it; but the slide valve in this case is partly operated by its fellow pump and partly by its own piston rod, causing the steam to be cut off, and cushioned as each piston reaches the end of its stroke. These pumps are being manufactured by Messrs. Cole, Marchent & Morley, engineers, Bradford.

## THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

### Naval Men and the Mercantile Marine.

**T**WO very excellent examples have recently been given of how little those connected with the Royal Navy bother themselves with exact details regarding mercantile vessels.

The first matter was the speech of Mr. Forwood in regard to "Water-tube Boilers in the Navy," delivered in the House of Commons at the close of April. He several times referred in his speech to the ordinary marine boilers of the Cunarder *Sylvania* which he said constantly supplied steam for engines of 25,000 H.P. Of course he meant the *Lucania* or the *Campania*, whose engines are fully of the power named. The *Sylvania*, as readers of these Notes all know, is a cargo ship of one-fifth that power. But she was a new Cunarder, and so the name slipped out. Mr. Forwood, himself a Liverpool man and a shipowner, probably realised his mistake. The newspaper people who commented on his speech with one accord accepted what he said, and a very fine pitfall has been dug for the future historian of steam navigation who gets hold of this discussion. He will search in vain for a mail steamer of that power and name.

The second matter to be referred to is a notice in the "Naval Notes" of the *Globe* about the rejuvenated *Germanic*. It begins with the words "In the year 1871 Messrs. Maudslay, Sons & Field fitted engines into a new steamer called the *Germanic*." They did nothing of the kind. The *Britannic* did not come out till 1874, and the *Germanic* followed her a year later. The statement too that "these two vessels maintained a steady speed of nearly 18 knots on both voyages," gives them a speed to which their owners would never lay claim. Sixteen knots is much nearer their true speed, and even that was a sufficiently marvellous rate of progress 20 years ago. Eighteen knots at sea was not attained till the time of the *Oregon* and the *America* about a decade later. The naval correspondent of the *Globe* is always accurate and interesting when he writes about naval matters, but it seems as though there was a feeling that any notice is good enough for merchant ships and that accuracy would be thrown away in such a connection.

### An Old Salt's Yarn.

I have been reading the reminiscences of a veteran sea captain, Mr. Robert Woodward, who has been in the service of the West India Royal Mail Co. almost from the inception of that undertaking down to the other day. The book cannot fail to interest all my readers. He tells of much that must have passed within the knowledge of most of them and he wakens many very interesting memories of the old times and the old methods. The whole is very chatty and—when the writer is dealing with the history of his own life—very accurate. When he speaks of strange vessels he occasionally gets a little astray. Thus he speaks of the *Corcovado* as having been built for the O. S. N. Co. He is just a letter wrong there. The company who ordered her was the Pacific Steam Navigation Co. Again he speaks of having met the old wooden paddle steamer *Arctic* in Halifax Harbour. She had at the time he mentions long gone to her rest at the bottom of the North Atlantic and the vessel he saw was another of the unlucky Collins' liners. But for those who want to see how the grand old sea-dogs who made our Fleets of the Mail Lines what they are, men who brought the old rule-of-thumb navigation to its present state of scientific accuracy, and who never were daunted by difficulties, however unexpected and however threatening, those who are attracted by this subject should obtain and read this book. It is also likely to be attractive to passengers, especially those travelling by the company's vessels, and should certainly be found in the library of every passenger ship. The title is "Nigh Sixty Years at Sea," and the book is published by Messrs. Digby, Long & Co., of Bouverie Street, E.C. After beginning his sea career in sail he entered the service of

the West India Mail Line as fourth officer and soon rose to be captain. A very large part of their fleet has passed under his command, and in them he has worked on both the main lines to the Islands and to Brazil, as well as on the intercolonial service. In the Crimea he saw a good deal of service in transport work; for the coffers of the Royal Mail Line were well replenished by public money earned in that service at a time when losses of ships had almost crippled the enterprise. It is an ill wind that blows no one any good, and the coming of that disastrous struggle was most opportune to the line. Every ship they could spare was taken up by Government and the rate of hire was calculated on no illiberal scale. "Three and sixpence a minute" is stated to have been the rate on one vessel of a couple of thousand tons, the Government finding the coal, which was in those days of extravagant engines an item of much consideration. Captain Woodward also commanded vessels chartered to other lines and so saw many persons and places where the company's flag is to-day unknown. The book is well stocked with the anecdotes which are generally associated with sailors of the old school. Such a tale as that of the author's appearance before the Lord Mayor on a charge of obstructing the streets of London with a string of waggons laden with specie must of course be taken with a grain of salt. The idea, however, underlying it is not quite what we should have expected from one used all his life to command. Implicit obedience to all orders, even if they appear unjust, from a competent authority is the keynote of discipline and a sea captain should set a good example to those who dwell ashore.

### Public Yachting

is an amusement which is very eagerly sought after, to judge by the number of public yachts that offer their various attractions to the reader of shipping advertisements. The attractions often comprise a flag which is very seldom seen over a big steamer, and fares so low that it ought to be patent to everyone that the shipowner could never recoup himself in passage money, even if his ship were always full of passengers, for liberal treatment of his guests. Yet the landsman is so confiding, or so ignorant, or perhaps has so much of both qualities, confidence and ignorance, that he goes gaily into the contract. There was one case where the Board of Trade stepped in and prevented the vessel going to sea at all. Whether the passage money prepaid was ever recovered in this instance I do not know, but in any case there was some little difficulty on that head and when arrangements made long previously were so suddenly upset many must have been disappointed altogether of the holiday to which they were looking forward. Now another difficulty has arisen. It seems that some of these vessels do not carry surgeons and so the hapless passenger must either wait for advice till he makes a port or he must take his luck as to whether there be a fellow-passenger with a medical qualification. If there be a doctor on board, however, to learn from what transpired in a recent case, there is satisfaction for neither doctor nor patient. For the former has presumably come away to get rest and to forget the calls of duty, whilst if he can be prevailed upon to give his services to his fellow-passenger the latter has to pay him for the advice. When we note all these matters—and there are others that could be named—it seems strange indeed that persons can be found to go by vessels whose owners have no well-known name or great reputation in the shipping world, especially when there are ships of such lines as the *Orient* always engaged in the business and available, if at a slightly higher figure. Such firms can always replace a vessel which is found unable to go to sea at the last moment, and are not likely to forget other details which pertain to the health and comfort of their passengers.

### The "Oroya."

Talking of the *Orient* Line reminds me of the *Oroya*. I mentioned briefly last month that she was off. First of all the salvors, who, by dint of patience, had worked her through an apparently impassable barrier of sand, took her to Naples. Thence she proceeded in tow, but with some slight assistance from her own engines, to Genoa. A week's stay there was all she required, and thence proceeded to Liverpool for a thorough refit. It is understood that the damage sustained is very much less than the most sanguine could have anticipated, as is evidenced by her using her engines so soon after being refloated. There was a most extraordinary passage in the judgment of the Court of Inquiry at Naples. First, they commented on the wonderful strength of construction which the vessel showed by her endurance of fifty days on the sands of the Bay of Naples.

This was deserved enough, and the Barrow Co. were well entitled to this praise for good workmanship. Then praise was given to the officers and crew for good discipline as shown by the behaviour of all under the trying circumstances of a stranding in a gale and in darkness. Here again, one is strongly with the remarks of the Court. But they went on to say that they considered the *Oroya* "undermanned with executive officers." Now this I cannot see at all. To use a true if somewhat homely proverb, "The proof of the pudding is in the eating" and good discipline could not have been preserved if there had not been sufficient officers to maintain order. Besides, the vessel carried as many officers as is usual in passenger ships of her tonnage, and of course many more than the great cargo ships of far greater capacity than hers, which are now not uncommon in various trades. The thing seemed at first a little incomprehensible, but the clue is to be found in the constitution of the Court. There were two officers of the Royal Navy, several landmen, and one Mercantile Marine officer. The Naval men naturally carried great weight, and their ideas of a proper complement of officers were of course based upon their own sea service. It would be a small man-of-war indeed that did not carry as many deck officers as the *Oroya*. But the duties of the two classes are entirely different and no comparison can be made between them. A man-of-war, for example, has to carry sufficient officers to make it improbable that a serious engagement shall leave her without plenty of responsible officers to bring her into port. No such eventuality has to be contemplated in the case of a peaceful merchantman, and in every way a comparison between the two is absurd.

The *Liguria* did a smart piece of work in connection with the accident to the *Oroya*. She was sent out to take the turn of the disabled vessel on the homeward trip. She accordingly left Liverpool on the 16th of March, just a fortnight after the accident at Naples. Five days later she called at Las Palmas and thence steamed to Sydney direct, making a passage of thirty-three days. As the distance is 11,000 miles her speed was about 14 knots throughout. She was not, however, pressed as she had plenty of time to take in her homeward cargo on arrival at Sydney. This is a good performance for a vessel twenty-one years old, though it must not be forgotten that she and the *Iberia* had new boilers and her engines tripled a year or so ago.

#### The New York and Mediterranean Service.

has proved so successful for the German liners that Cunard's are making a bid for their share of the work. Some couple of months ago they ran the *Marathon* from Naples and the Mediterranean ports to Queenstown and there transhipped passengers to the *Lucania*. On that occasion passengers had to strike an average. If the *Marathon* is not quite up to date, the *Lucania* is quite able to make up for her deficiencies. But in April they sent the *Bothnia* to Naples and thence, via Gibraltar, to New York. As will be remembered, the *Bothnia* was the favourite ship of the line twenty years ago. Latterly her services have not been required, even as a stand-by, on the New York line and she has been transferred to the Boston service. Last year she made a trip to the East on Government account. She is as comfortable a ship as was ever built, even in those days of moderate speeds, and the experiment will be watched with interest. It certainly seems a pity that foreigners should be allowed to take all the cream of the traffic in this trade without our people making the least attempt to get their share.

#### Russian Passenger Steamers.

A few months ago I referred to the loss of the *Vladimir* and to the charges brought against her captain and crew. It appears that a steamer belonging to the same company has been lost by collision in the same spot as she was. This time, fortunately, the colliding vessel is a Russian Government steamer and so we are likely to have a fair field and no favour. The collision this time is said to have taken place in fine, clear weather. There was some considerable confusion amongst the passengers, as was, of course, only natural. A boat was lowered and into it were put some seamen and a Russian sea captain, who happened to be a passenger. Another passenger, a lady with a life belt, was also got into the boat, when the latter capsized and all the occupants were thrown into the water. The Russian master mariner was then observed to be struggling with the lady for her life belt. He did not, however, succeed in his object, for the vessel struck them and ended the contest for ever. This, at least, is

the story as printed in the *Daily News*. We must, however, hope, for the sake of our common humanity, that these tales of Russian sailors are somewhat exaggerated.

#### The Union Company

is always engaged in keeping its fleet up to date. If we do not note the advent of a ship of the latest class we bid adieu to one of the older ships of the fleet. The last to go is the old *German* which came out only some 18 years since. She was built by Denny's, at Dumbarton, and is a vessel of 3,000 tons gross. Her departure leaves the *Pretoria* as the patriarch of the fleet—a patriarch of 17 years.

#### New York Harbour Improvements.

Last month I mentioned the new arrangements which were about to come into effect at New York to prevent delay to passengers and mails by steamers which arrived after sundown. These arrangements were inaugurated in the case of the White Star liner *Britannic*, which arrived out on the evening of the 10th May. She reached quarantine at 9 o'clock. The mails were landed but the passengers preferred to stay on board till next morning, as it was 11 p.m. before they had the opportunity of disembarking. As I ventured to prophesy, they preferred to leave the toils and delays of disembarking till the morrow. But the fact that they were able to exercise an option in this matter makes the privilege a valuable one, and one that can be availed of by hurried through passengers.

#### La Compagnie Generale Transatlantique.

Some little time ago I spoke of a contemplated attack on the French passenger traffic by the German liners. Nothing has been heard of that again. I thought at the time that the attackers would risk any English traffic they might have if they carried out their project, and that they would have very little chance of taking much by their action. The French passenger has gained however by the mere suggestion. On the 1st of June the maiden trip is to be made of a train *de luxe* which consists of five cars owned by the Compagnie Generale Transatlantique. Each car of the train bears the name of one of the line's express steamers. These are arranged *en suite* and are fitted with every luxury and comfort which experience can suggest. Against this provision for the land journey from Paris to Havre, and the excellent cuisine and accommodation of the company's steamers, opposition will be silenced or at least will only lead to defeat. It is interesting however to see how in every quarter the Atlantic passenger is benefiting by the competition of the various lines and ports for the first place in the race across the Atlantic.

#### The Derelict Question

is one that is still exciting a good deal of attention, but it is still impossible to arouse the British authorities to take any interest in the removal of these dangers. Private enterprise is attempting to make up for official apathy. A floating wreck was reported a short time ago off the Irish coast, right in the track of the Liverpool and New York Mail steamers. As no one else seemed inclined to move in the matter the White Star and Cunard Lines took joint action. They chartered a powerful tug and sent her in search. She was cruising for a fortnight, but did not succeed in her quest. Another Liverpool tug was, however, more successful and managed to tow the wreck into port. As the cargo consisted of valuable timber there was some reward for this service beside the consciousness of having benefited the public.

#### "La Gascogne."

is unfortunate with her new engines. She has again been overdue, though this time anxiety was not pressed to so high a pitch as on the former occasion. Measured by an underwriter's standard it was considerable, however, for the premium for re-insurances ran to eight guineas. She arrived in safety at New York on the 21st May, having made a passage of twelve days instead of between seven and eight. The cause of the delay was strangely enough a breakdown of precisely the same kind as the previous one, and it affected the new piston rod which had been put in to replace that broken on the former occasion. The weather was fortunately of a very improved character this time, and the ship was able to effect temporary repairs, and do 8 knots during the latter part of her trip. An inquiry into the causes of these breakdowns would be most valuable, if sufficient facts can be elicited to form a proper groundwork. It would appear, on the first glance, that some unusual strain must be put upon the piston rod of this particular cylinder—a strain which was caused by something recently developed. Perhaps the form of the ship's

the position of the cylinder has got slightly altered and a bending stress is now put constantly upon the rod.

#### A Pleasant Ceremony

was enacted at Liverpool on the 21st May, when the rewards bestowed by the United States Government upon the captain of the *Teutonic* and the boat's crew from that steamer which rescued the crew of an American fishing vessel off New York on the 8th February were publicly presented. A presentation was also made by the owners of the vessel to Lieutenant Brown in recognition of his bravery in springing overboard after a passenger in the Irish Sea as mentioned recently in these Notes. Attention was called to the fact that whilst the American Presidents and the German Emperor always make a point of showing their appreciation of rescues effected by our people of their subjects, our authorities are most apathetic in their recognition of similar services rendered to British sailors. Thus the attempt made to obtain an Albert medal for Lieutenant Brown has not been successful, and Capt. McKinstrey of the *Adriatic* is still without any official notice of his feat at the Spithead Review of 1889. On that occasion the person rescued was not only a British sailor but an officer in Her Majesty's Navy. These slights are not likely to prevent brave men from risking their lives for their fellows but they are nevertheless most unfortunate, for they are an indication of a spirit that either in public or in private life is most regrettable. It shows that politics and party dominate everything connected with our Government and that nothing which does not tend to the getting of votes for the party in power will be worthy of the attention of departments or their chiefs.

#### The Nottage Bequests.

I mentioned soon after the death of Captain Nottage that he had left certain legacies to perpetuate his memory in connection with the sport he loved. These bequests would have tended to benefit the community at large by the encouragement of yacht building and of the science of seamanship. The law, however, with regard to legacies of this kind is in a very extraordinary condition owing to historical reasons which need not be dwelt upon here. Suffice it to say that the bequest of two thousand pounds left for the establishment of the "Nottage" Cup has been impugned by those interested in the estate and that the Courts have reluctantly concluded that it is not a valid gift. The "Nottage" Cup will therefore never be offered for competition as the donor desired so earnestly it should be.

#### The "Germanic."

This vessel has, as usual, defeated expectation and upset precedent. She left Queenstown at 1 p.m. on the 16th May and was at New York at 12.30 p.m. on the 23rd. Allowing for difference in time this is a passage of 7 days 4 hours. It is, of course, better than anything she has ever done. It is done, too, over the long course, which makes a difference of say six hours longer than the course prevailing during the record-breaking season. That would make her passage equivalent to 6 days 22 hours over the short course. This is, to all intents and purposes, a maiden trip, and it is a better speed than that made by either the *Umbria* or the *Etruria* on their first voyages. We cannot suppose that the *Germanic* will rival them, but she has proved in this run that she is at least equal to the famous record-breaker *Alaska*. Her homeward trip will be equally interesting, but ere it is completed these Notes will be in the hands of my readers

**New Light-ship.**—The Strand Shipbuilding Co., Sunderland, have obtained from the Trinity House an order for a new light-ship.

A Floating dry dock has lately been launched at Benicia, Cal., capable of holding a vessel of 3000 tons. The dock is 300ft. long and 95ft. wide, and will cost £24,000 when fully equipped for service. San Francisco now has five dry docks, several of them large enough to handle the largest ocean steamer.

Messrs. Joseph Wright & Co., of Tipton, have introduced some improvements into the Martin anchor, which have enabled one in a recent test to destruction by Lloyd's to stand 400 per cent. above the Admiralty test.

#### THE "DEFIANCE" PATENT ANCHOR.

ALTHOUGH there have been many and various improvements in the construction of all classes of anchors during the past few years, it does not appear that finality has been reached in the design of these devices. We have pleasure in presenting to our readers the description and illustrations of the



FIG. 1.

"Defiance Patent Anchor," for which certain advantages are claimed. On reference to the illustrations, it will be seen that Fig. 1 is a perspective view; Fig. 2 is a side elevation; and Fig. 3 is a plan of the anchor.

The action of the arms of this anchor is somewhat similar to the principle of the Martin anchor, i.e., the

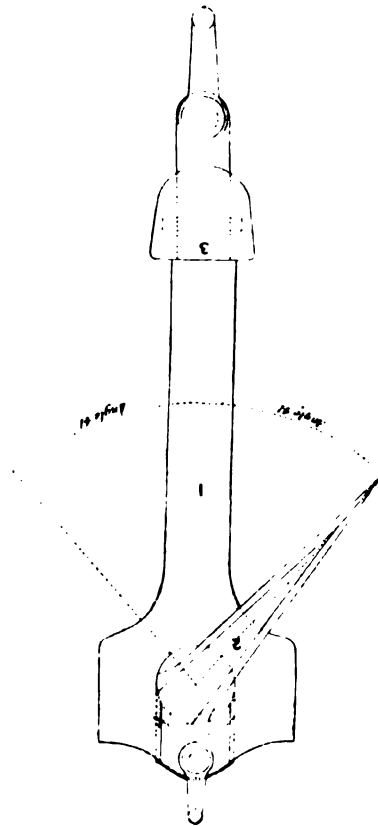


FIG. 2.

self-canting of the arms allows them to simultaneously take hold of the bottom; but instead of having any pins or bolts, which are often a source of weakness, two shoulders project from the crown of the arms, a slot being arranged between the shoulders, into which a plate engages. This plate is passed down into place through a hole in the crown of the head. The shoulders and arms being made in one piece, not only

provide a double stop-action, but considerably increase the strength of the arms at the part of greatest strain. The anchor has no stock, but is made with or without, what are called steadying arms, which have a holding power almost equal to that of the two main arms, especially in shingle, muddy, soft or sandy bottom. The anchors are made of Bessemer's or Siemen-Martin steel, and are absolutely weldless, the flukes being composed of one solid piece, and the shank of another, and the severe strains when the anchor is in use are confined entirely to these solid pieces. It will be noticed that by its simplicity of construction, all pins, keys, bolts, colters, side-plates, and box-heads, subject to strain, and liable to have their

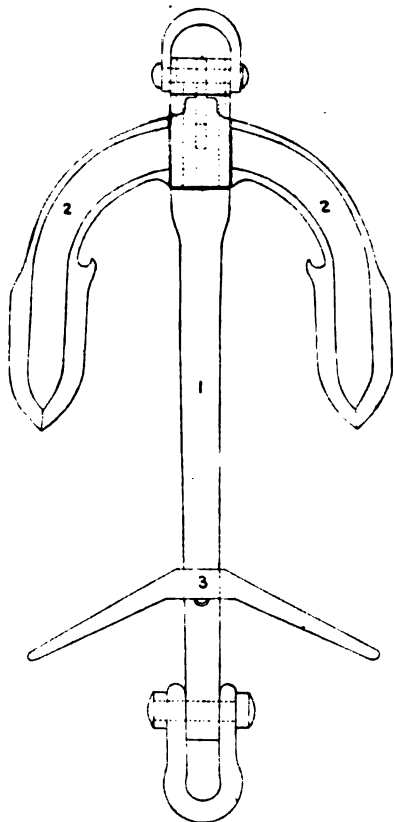


FIG. 3:

action interfered with by sand or earth, are dispensed with, and in addition increased bearing surfaces are provided, which ensure greater holding power, strength, and durability.

Many important advantages are claimed for this anchor, amongst which may be mentioned that it possesses very considerable holding power; it cannot drag in any sort of ground; it is extremely light for the strength; it will act immediately and certainly in whatever position it is cast; it is self-canting; it is impossible to foul it or get it fouled; it can be catted and fished with ease and rapidity; it will stow flat alongside or inboard; and, lastly, by reason of its simple construction, can be made cheaply.

This anchor is being put upon the market by the Defiance Patent Anchor & Cable Co., (Secretary, Mr. S. Seymour Gordon), of 18, Billiter Buildings, Billiter Street, London, E.C.

## PATENT COMPOSITE STEAM PIPE FOR HIGH PRESSURES.

FOR some time past there has been subjected to severe tests in Glasgow a form of steam pipe combining a copper interior with a spirally-wound steel-wire outer body, which has several outstanding advantages over copper steam pipes as ordinarily manufactured, the most important being its fully and economically meeting the requirements of increasing steam pressures.

This composite pipe, which has been patented by Mr. R. D. Smillie, electrical engineer, Mains Street, Glasgow, corresponds in general structural principle to that upon which the production of the heaviest modern ordnance is now based, and consists of a thin interior shell of copper, wound closely round which, and in intimate contact with it, is a coil of steel wire of square section and of high tensile strength. The steel coil is wound on the shell while it is rotating in a bath of molten alloy of special preparation, by which means the shell and coil are fused into a solid mass. The melting point of the alloy, it may be stated, is sufficiently high to obviate any risk of its being affected by the temperature of steam of the high pressures now common. The copper shell is of sufficient strength to withstand the longitudinal stresses produced by any given pressure of steam acting on the sectional area of the pipe. The circumferential stresses are provided for by the coil of steel wire. The fibre of the coil is at right angles to the circumferential stresses, and is thus theoretically and practically in the best position to withstand them, while all the risks are avoided common to pipes with brazed or welded joints, as well as to solid-drawn pipes, in which latent defects are not infrequently found: in which, too, the fibre of the metal, being parallel to the circumferential stresses, is in the least effective position for resistance.

Several highly important advantages are claimed for the pipe as prepared under the fusing process. In the event of the wire coil being from any cause broken or cut it will not unwind. Even assuming that every second turn of the coil is cut, the strength of the pipe will not be materially affected. The fusing prevents corrosion and the possibility of galvanic action, which occurs where metals of a dissimilar nature constitute the pipe. Pipes of a given size, to withstand a given pressure, having a copper shell manufactured by the process will, it is claimed, only be about one-half the weight of brazed copper pipes made to withstand the same pressure.

The pipe, which has been repeatedly subject to severe tests, is 9 ft. long and 9 in. in diameter. Its weight per running foot is 24·8 lbs., while the weight of a pipe of similar calibre, and to withstand the same pressure, would be by Board of Trade rules as much as 66 lbs. per foot. In the works of Messrs. Mechan & Sons, Elliot Street, Cranston Hill, Glasgow, on the 17th ult., the pipe was shown under a pressure of 250 lbs. per square inch, the steam at this high pressure being generated in a "Haythorn" tubulous boiler, at the same time shown under forced-draught trial. Previously the pipe had been subjected to both steam and hydraulic tests. The steam test extended over a period of ten successive weeks; the pressure applied was 160 lbs. per square inch, and the pipe was cooled to atmospheric temperature four times daily—frequently by the application of the hose. Under the hydraulic test the pressure was repeatedly as high as 1,800 lbs. per square inch. These tests have discovered no weakness or flaw, and there is no appearance of the pipe having been deleteriously affected or of any structural change.

**Fast Passages.**—A telegram received reports the arrival of the large Leith-owned four-masted ship *Royal Forth*, at Newcastle, New South Wales, from Rio de Janiero, after a remarkably fast passage of 60 days.

**Mechanical Ventilation.**—We are pleased to record that the Russian Steam Navigation Co. has been so highly satisfied with the efficiency of the "Baird-Thompson" improved system of mechanical ventilation introduced into their fleet some time ago, they have again contracted with Messrs. Baird, Thompson & Co., Limited (ventilating engineers, London and Glasgow), for the introduction of their system into the large new steamers at present being built for them in this country. This speaks volumes for the "B.T." system.

## WATER-TUBE BOILERS.

ON Monday evening, May 13th, a paper, entitled "Some Remarks on Water-Tube Boilers," was read before the members of the Hull and District Institution of Engineers and Naval Architects, by A. E. Seaton, Esq., M.I.C.E., &c. In the absence of the president through indisposition, Mr. J. Spear (past president) took the chair.

So much (said the lecturer) has been said and written lately on the subject of water-tube boilers by people who, either deliberately shut their eyes to the facts, or else have had no opportunities of becoming acquainted with the boilers in question, that the issue in the argument of Water-Tube Boilers *versus* Tank Boilers is very confused, so that those who have but a limited knowledge of the case can form but a very erroneous opinion. He purposed making clear, as far as possible, the demerits, as well as the merits, of what is known as the water-tube system, and to set forth some of the facts brought to light by the latest experience, so that the members of the Institution might have a better idea as to why the Admiralty, and some other individuals, equally enterprising, are employing that which by some is so much abused. As the interest in the water-tube boiler is moreover likely to become general, the knowledge of the first principles governing the design and construction of it are important to everyone. In former years their use has been restricted on account of the difficulty of obtaining suitable feed water, but the perfecting of the evaporator has emboldened engineers to again adopt this type of boiler. From an historical point of view considerable interest attaches, inasmuch as it is now 90 years since the first water-tube boiler was made in America for marine purposes. The design of boiler to be successful was next considered. Diagrams of the elements of the Belleville, Babcock & Wilcox, Du Temple, D'Allest, Thornycroft, Yarrow & Normand boilers were exhibited, as well as an illustration of the Goldsworthy-Gurney boiler, invented in 1827, of which the most successful modern forms of water-tube boilers are more or less the outcome.

The lecturer described the principle on which water tube boilers should be constructed, and he argued that there is strong presumptive evidence that a water-tube boiler must be *lighter, safer, and more efficient* than an ordinary cylindrical one. Another point in their favour is the rapidity with which steam can be got up, which is obviously a very considerable advantage.

No particular invention was selected for notice, the lecturer mentioning only that one was an old and tried invention, and had been largely used in other countries, that another is manufactured by the hundred, and that others have enabled comparatively small steamships to travel at rates of speed that at one time were deemed beyond the wildest stretch of the imagination.

The fact that accidents had happened with these boilers was freely admitted; but on the other hand it was pointed out that accidents with tank boilers of all classes have been and still are of almost daily occurrence.

The claims of the water-tube boiler for consideration are—(1) that it is a safe one to employ for steam of very high pressures, and so makes it specially suitable for quadruple compound engines; and (2) that it is very much lighter than any other form for the steam produced, and hence admits of higher speeds in all classes of ships than are attainable with the tank form of boiler.

Figures taken from actual practice were adduced in support of the claims made, especially in the comparison of weights of various types of water-tube boilers per I.H.P. as against cylindrical boilers.

At the close of the paper a discussion ensued, in which Messrs. J. Spear, W. B. Dixon, W. H. Willatt, R. Carson, and W. H. Brodrick took part.

Mr. Seaton having replied to the points raised, a hearty vote of thanks was accorded him (on the motion of Mr. J. Spear, seconded by Mr. G. H. Strong) for the trouble he had taken in preparing so interesting a paper.

**Hastie's Patent Rudder Brakes.**—Four steamers in course of construction at Greenock for the Peninsular and Oriental Steam Navigation Company are all to be fitted with Messrs. Hastie's patent rudder brakes. These four steamers are designed to aggregate 22,000 tons.

## NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondent.)

### Pembroke Dockyard.

THE launch of the *Renown* on the 8th May was successfully accomplished, though at one time there was a very fair suspicion that the launch would be a repetition of the accident at Messrs. Cramp's yard, when the *S. Paul* refused to move altogether. Fortunately the exercise of a little judicious persuasion from a hydraulic ram induced the big ship to take the water. I gave an account of her in my last Notes, and I will not repeat what I then said.

Orders have been issued for the commencement of a first-class cruiser to be called the *Andromeda* at Pembroke. She will be one of the class described last month. In speaking of the speed it was given as "a continuous sea speed of 19 knots." This is perhaps hardly the way to speak of warships' rate of travel, and it makes comparison with other men-of-war difficult. It will therefore be best to put the *Andromeda's* estimated speed as "20.5 knots on trial."

### Chatham Dockyard.

is very busy over the *Magnificent*, and every exertion is being made to get her completed within the shortest possible time. There is one of the new type of second-class cruisers to be built here, and she is to have the name of *Vindictive*. Her engines, like those of the *Minerva*, now rapidly approaching completion, will be built in the dockyard.

### The Japanese Navy.

A very interesting paper on this subject, which has been recently so prominently before men's minds, was read by Dr. Elgar on the 8th May at a meeting of the Japan Society. He traced the development of the Japanese Marine from the time—only some forty years ago—when the law forbidding the building of large sea-going ships was repealed. Previous to that time the maximum tonnage allowed was about 76, and vessels were only permitted to have one mast. Now the Japanese have a merchant shipping company which ranks with the British India Company and the North German Lloyd in the magnitude of its fleet, whilst the State has a navy comprising sixteen cruisers, an armour-clad, a torpedo gunboat, ten sloops and gunboats, beside the ten Chinese vessels which were added to the conqueror's navy at Wei-Hai-Wei. These include three ironclads and a deck-protected cruiser.

But the Japanese are not going to stop the expansion of their Navy because they have conquered the Chinese fleet. They are building in their own yards three 20-knot cruisers, and in British yards two first-class battleships of the largest size and greatest force. The latter are very much of the *Royal Sovereign* type. Their length is 6 ft. less than hers, and the beam 2 ft. less. The displacement will be 12,150 tons, at 26 ft. 6 in. draught, as against 14,150 at 27.6 draught in the case of the British ship. Only 700 tons of coal is to be carried, which is 200 tons less than the limited amount allowed by our designers. The armament will comprise four 12 in. Elswick guns and ten 6 in. quick-firers, besides smaller quick-firers. This is the same main armament as our *Magnificent* carries, though the latter has twelve 6 in. guns. The defensive armour is of Harveyised steel plates, 18 in. thick in the belt and 14 in. thick on the barbettes. The belt, by the way, is to be 16 ft. longer than that in the *Royal Sovereign*.

One of these vessels is being built by the Thames Ironworks and the other at Elswick, where for the

### Argentine Navy

there was launched on the 10th May a very remarkable cruiser called the *Buenos Aires*. She is of some 4,500 tons displacement, and has twin screws driven by engines of a collective force of 17,000 H.P., guaranteed to give her a speed of no less than 24 knots. Needless to say she will be the fastest cruiser afloat by something substantial. She is to carry quick-firers throughout, there being a pair of 8-in. guns as bow and stern chasers, whilst five 4.7-in. will be placed on each broadside and about twenty smaller Hotchkiss guns will also be given her, besides torpedo tubes.

### At Devonport

two new second-class cruisers, the *Arrogant* and *Furious*, are to



be commenced. The third-class cruiser *Ovaco*, just returned from a six years' commission, is to be refitted to take the place of the *Calyco* in the training squadron.

#### Portsmouth

has at last been allowed to get the old *Sultan* sufficiently near the end of her refit to permit of her being undocked. This re-engining and rebuilding an old ship will cost the country over two hundred thousand pounds, and yet when all is finished she will have a main armament of obsolete and useless muzzle-loaders. One of the most obvious lessons of the war in the East was that it would be impossible to work muzzle-loading guns under the rain of projectiles experienced in a modern engagement, and so to all intents this large sum of money will be thrown away.

When the *Prince George* is launched her place on the slip will be taken by a new second-class cruiser of the "improved *Talbot* type to be called the *Gladiator*.

The covered docks in this yard are to have the roofs removed, so that there may be accommodation available for overhauling vessels which have not been dismantled.

#### Torpedo-boat Destroyers

seem to be in favour just at present. Mr. Thorncroft has been reading papers about them and their uses. He concludes that the use of these vessels would be very greatly enhanced if they were painted so as to make them difficult targets, and this is obviously a point to be borne in mind. But after trying various tints he finds nothing which is so effective for his purpose as a mixture of tints in patches so as to dazzle the eyes of hostile gunners. Ships get less beautiful almost every year, but it will take some education to make smart sailors accept a condition of things which will make their ships look as though they had been partly painted by a number of colour-blind workmen. For naturally the more irregular the shade and size of the patches of colour the more difficult will they be to the hostile eye.

The Laird-built destroyer *Ferret* has had a little service at sea. She took some ministerial despatches from Devonport to Falmouth in unfavourable weather at speed. The distance is not a great one, but she achieved a speed of 22 knots both going and returning. This is an experience of which both favourable and unfavourable comment can be made. On the one hand it shows that 27 knots on trial is not to be expected to be reached in actual practice. On the other hand it shows that these little boats can maintain a really high rate of speed in ordinary channel weather. We may be sure that weather which affects them appreciably would render the torpedo-boat they have to keep in check absolutely useless.

#### The Festivities at Kiel.

The programme has been altered so much that it seems useless to try to give any account of the intentions of the various guests and of the arrangements for the ceremony. About 117 warships are expected to be present. Of these we shall have ten. They will be very good specimens of our modern Navy. Four first-class battleships, one first-class and two second-class cruisers, one third-class cruiser, and a torpedo gunboat of the vessels built under the Naval Defence Act will be included. The other vessel will be the *Blenheim*, one of the biggest and fastest cruisers we have.

The United States will have four ships, including the triple screw *Columbia* and the 8,000-ton *New York*, which is comparable with our *Blenheim*. The German Navy will of course be present in force, 61 of their vessels being expected to be present. Altogether 20 Admirals and 27,000 men are computed to belong to these fleets, and the Reichstag has voted £65,000 for the festivities.

#### Death

has been busy within the last few weeks. The occupation of that miserable collection of huts called Corinto will be memorable in a way that was hardly to have been foreseen. It cost the life of Captain Trench, who acted as Governor of the town during our occupation, and who caught fever there and died at sea. Captain St. Clair of the *Edinburgh*, to which he had only just been appointed, has also died. Both these officers were comparatively young men who might have looked forward to many more years of distinguished service for their country. Older officers who had seen service in former days were Admiral Sir George Elliott and Vice-Admiral Chapman.

#### At Sheerness

there is to be laid down shortly the *Pelorus*, a third-class cruiser. Here too is to be refitted the third-class cruiser *Champion*, which has returned from the Pacific and is to replace the *Ruby* in the training squadron.

#### The Programme for the Naval Manœuvres

is now being settled. The vessels in the Devonport list are published. They include seven torpedo boats, six destroyers, four cruisers, two special service vessels and three torpedo vessels, as well as eight guardships. One of these is the *Conqueror*, and her inclusion is protested against on the ground that her slow speed and bad steering qualities make her a disadvantage to the fleet to which she may be allotted. It would be well if this fact, that want of speed in one ship jeopardises a whole fleet, were recognised more clearly by our Naval authorities.

#### Bulkhead Doors.

The importance of either having no doors in bulkheads or of having more efficient means of closing them than have hitherto been devised, has been recognised across the Atlantic both in the Naval and Mercantile Marines. It is now stated that an electric apparatus has been invented by an American officer, whereby every bulkhead door in the ship can be instantly closed from the conning tower by a single movement, and that one of the new warships now building for the United States Navy is to be fitted with the appliance.

**Steamship Circular.**—Messrs. H. E. Moss & Co. say—"In our semi-annual Circulars for the last two years, we have persistently called attention to the depressed condition of shipping property, and have cautioned our friends against the unwisdom of building new tramp tonnage except for special requirements. That our advice was correct is proved by the fact that although last season's cotton crop was the largest on record, amounting to about 9,000,000 bales, it was moved without the least difficulty, and lower rates were accepted this season than ever known before. The amount of new merchant tonnage built during 1894, according to statistics already before you, was 1,046,508 tons, or, allowing for the losses during the year, still shows a nett increase in tonnage for the United Kingdom of 482,000 tons for the year. The prices for building new steamers remain abnormally low—in fact, never in our experience have been lower; some yards are closed, and nearly all the builders are most anxious for work. We are glad that owners of old tonnage are at last realising the uselessness of holding on to their property, and consequently about 100,000 tons, out of at least 500,000 tons available, have already been broken up. It is absolutely impossible for such tonnage to be worked at a profit, or to compete any longer with modern light-draught triple steamers, carrying, in many instances, double the deadweight on the same draught of water. One good feature we have to chronicle, and that is the marked improvement recently in values of almost all kinds of produce, and especially the increased value of silver, which must have a beneficial effect on freights, and consequently on the values of shipping property; but it is to be hoped that the bitter lessons learnt will not be without warning, and any fresh undue rush into new tramp steamers will be avoided. The war in the East between Japan and China created, while it lasted, employment for about 250 British and foreign steamers, and many owners were fortunate enough to dispose of their property in Japan on satisfactory terms. The conclusion of peace and the cessation of hostilities will bring about in time the opening up of the vast empire of China to the commerce of the world. This, combined with the gradual increase in the values of produce and silver and the cessation of ruinous over-building of new tramp tonnage, will do a great deal to soon put the shipping trade in a different and more satisfactory position."

**The New Steamer "Wicklow."**—Since Mr. Watson's speed was made at the official trial, it may be added, the decision in the matter of the mail contract has been given. The Government have renewed the contract with the City of Dublin Steam Packet Co., for a period of twenty years, at the rate of £100,000 per annum. This is an increase of £15,000, and the Company have undertaken to build four new and more powerful steamers, so that the passage from Holyhead to Kingston will average at least half-an-hour less.

## NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from April 24th to May 25th, 1895:—

Agnew, J. W., chief engineer to the *Dido*, to date May 18th.  
 Barnes, B. J., staff engineer to the *Cordelia*, to date May 18th.  
 Bone, Howard, engineer to the *Sharpshooter*.  
 Bouneville, Joseph A. W., assistant engineer to the *Tamar*, to date May 28th.  
 Burnett, W. O., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.  
 Cleave, R. C. (probationary), assistant engineer to the *Royal Arthur*, to date May 3rd.  
 Cumming, G. R. T., staff engineer to the *Calypso*, to date May 11th.  
 De Paris, V., acting engineer, has been confirmed in the rank of engineer in Her Majesty's fleet.  
 Edgar, E. J., engineer to the *Leda*.  
 Hay, C. J., engineer to the *Victory*, to date May 11th.  
 Hughes, Thomas, fleet engineer to the *Vivid*, additional, to date April 27th.  
 James, W. H., engineer to the *Halcyon*.  
 Juniper, W. V., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.  
 Lock, Henry J., fleet engineer to the *Tamar*, to date May 28th.  
 Meadus, W. H., engineer to the *Ardent*.  
 Murray, George W., engineer to the *Tamar*, to date May 28th.  
 Newton, George S., fleet engineer to the *Invincible*, to date April 27th.  
 Paterson, G. T., assistant engineer, has been promoted to be acting engineer in Her Majesty's fleet.  
 Skinner, W. H., fleet engineer to the *Australia*, to date April 27th.  
 Smith, Frederick T., assistant engineer to the *Tamar*, to date May 28th.  
 Thompson, J. M., chief engineer to the *Hebe*, to date May 23rd.  
 Turner, A. W., chief engineer to the *Sharpshooter*.  
 Vibert, J. E., engineer to the *Halcyon*.  
 Vining, Henry P., engineer to the *Vernon*, for the *Seagull*, to date May 23rd.  
 Whebbey, Thomas, staff engineer to the *Vivid*, for the *Hermione*, to date May 11th.  
 Williams, S. B., fleet engineer, has been placed on the retired list.

## HOAR & BROWN'S HARDWOOD MARKET REPORT, MAY 24th, 1895.

TRAK:	Timber	Planks	Blocks	Total
	Loads.	Loads.	Loads.	Loads.
Stock 1st May	5,524 ..	2,177 ..	60 ..	7,761
Landings	2,579 ..	554 ..	— ..	3,133
	8,103 ..	2,731 ..	60 ..	10,894
Deliveries	2,064 ..	231 ..	— ..	2,295
	6,039 ..	2,500 ..	60 ..	8,599

The deliveries have been exceedingly good, showing a remarkable increase over any one month during the last two years. This is a pleasing fact to record, considering the continual outcry of bad trade, which is heard on all sides, as, although a large proportion of the deliveries have gone to H.M. Dockyards, more than half have found their way into London consumption.

The cargo of Bangkok wood remarked upon by us in our last is advertised for sale without reserve, the owners no doubt wishing to realize promptly and save dock rent and interest.

Planks have been imported very freely, and as sales cannot keep pace with the supply, prices have receded.

The stock is still too heavy.

MAHOGANY.—The forced sales of large cargoes, other than Honduras, have again demoralized the market. The very fact of the brokers holding for a 2½d. minimum, and after clearing out upon several occasions at that figure, forcing other cargoes later on without reserve and selling at 1½d. and 2d. per foot, is sufficient to discourage buyers, who have found themselves being underbidded by nearly 50 per cent. There are still two more cargoes, which are destined to destructive handling, and prices

are expected to again touch the lowest point yet reached and may be a trifle lower, as the wood is very shaky.

The dock merchants have met offers of Cuba with a decided denial, and latterly large quantities offered for public sale have been withdrawn in consequence.

Panama and African, unless good and sound, find very little support, and sales are only made at ruinous prices.

CEDAR.—The market is very dull and the only demand is for long boat building logs, which are not to be had at present.

KAWIA PINE has been doing fairly well, even at sales where it has been forced lately. The importations likely to be made in the near future will try values very hard, and probably cause a slight decline.

SEQUOIA.—At the last without-reserve sale a further depression in prices was noticed, and should sales of this character continue a still further drop will take place, as there is little demand of any kind for Sequoia at the present moment.

Business may be described as unusually quiet, taking hardwoods all over, and a hand-to-mouth style of buying is mostly adopted among manufacturers.

## INDUSTRIAL AND TRADE NOTES.

### THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

THE past month's doings in the shipyards of the Clyde have been characterised by considerable activity and stir, an exceptionally large number of vessels having been put off the stocks, some of them of the largest tonnage. The chief event in this way was the launch of the first-class cruiser *Terrible* from the stocks of the Clyde Bank establishment, which took place on the 27th ult., in the presence of a large concourse of spectators.

The total tonnage turned out during May approaches 48,000 tons, the most notable of the vessels as regards size and equipment being the *Malta*, of 5,800 tons, built by Messrs. Caird & Co., Greenock, for the P. & O. Co.; the first-class cruiser *Terrible*, of 14,250 tons displacement, already referred to, and the *Okha*, of 6,000 tons, for the British India Steam Navigation Co., from the yard of Messrs. Denny, Dumbarton.

As regards fresh orders for shipping, a very cheerful state of things falls to be recorded, the new bookings for the month amounting to no less than 56,000 tons, considerably in excess of the output. This large figure is for the most part made up by new vessels of considerable tonnage for several well-known Ocean lines, the Cunard, the P. & O., the Alfred Holt & Co., &c. Particulars as to the separate orders are afterwards given.

The usual number of petty disputes amongst workmen have occurred here and there, as if to put a brake on the accelerated powers of production which shipbuilding works now possess. Discontent, which has been quietly simmering for some years over the piecework system amongst carpenters, has broken out in open agitation at Dumbarton, where the system has been in vogue for many years. To this and other labour matters I will refer later.

Clyde shipbuilding firms who are on the Admiralty list are eagerly preparing for the opportunity of tendering for the construction of three of the four first-class cruisers included in the new programme. At present, of course, they are provided with a fair amount of Government work. All the torpedo-boat destroyers consigned to their hands last year have been launched and several of them finished, and three of them, the Clydebank trio, taken over by the Admiralty, but they are still engaged upon one first-class battleship, a first-class cruiser, and four second-class cruisers. The *Jupiter*, as the battleship has been named, is well advanced in the yard of Messrs. Thomson, Clydebank, though her progress was much delayed owing to the coal strike of last year. Messrs. Thomson, however, expect that she will be launched before the close of the present year. The first-class cruiser *Terrible*, as already stated, was launched from the stocks at Clydebank on the 27th ult., and more than one of the second-class cruisers, now in the yards of the Fairfield and London and Glasgow Companies, will be launched in the course of the summer.

Messrs. Alexander Stephen & Sons, Linthouse, have booked an order from the Cunard Co., of Liverpool, to construct a large steamer of 6,500 tons for their service between Great Britain, New York, and Boston.

Messrs. John Shearer & Son, shipbuilders, Kelvinhaugh, have contracted to build a steel screw steamer of about 400 tons gross register, which is intended to be employed in the Irish coasting trade. On their patent hauling-up slip, Messrs. Shearer & Son have been kept exceptionally busy for some considerable time.

Messrs. Mackie & Thomson, shipbuilders, Govan, early in the month sub-contracted with Messrs. Alex. Stephen & Sons, of Linthouse, to construct a small two-masted missionary steamer, of about 160 tons register, for service on foreign mission stations.

Messrs. Russell & Co., shipbuilders, Greenock, have secured an order to build a large cargo steamer of, it is said, about 8,000 tons deadweight carrying capacity, the engines for which on the triple-expansion principle, and of about 2,000 I.H.P., have been given out to Messrs. Rankin & Blackmore, engineers, Greenock. The same firm have also contracted to build a steel sailing ship, of 1,800 tons register, for Messrs. Crawford & Rowat, Glasgow, to replace the *Port Errol*, which was destroyed by fire off Arran a few months ago. Messrs. Russell have also secured an order to build two 1,300-ton sailing barques.

Messrs. Rankin & Blackmore, engineers, Eagle Foundry, Greenock, have booked an order to construct a pair of diagonal compound surface-condensing engines for a river passenger steamer, the cylinders being 23 in. and 44 in., with 51 in. piston stroke.

Messrs. A. Rodger & Co., Port-Glasgow, have just entered into a new lease with the Harbour Trust for an extension of their shipbuilding yard. Their application, which is to reclaim about 6,000 square yards waste ground from the East Harbour, was considered by the Harbour Trust on the 8th ult. and agreed upon. This extension will enable Messrs. A. Rodger & Co. to build steamers of the larger class now common. As evidence of this it is interesting to state that the firm, about mid-month, contracted to build a steel screw steamer of about 5,500 tons carrying capacity for Mr. Hugh Hogarth, Glasgow and Ardrossan. They are also about to lay down the keel of a 1,600-ton sailing ship for the Glen Shipping Co., managed by Messrs. Stirling & Co., Glasgow, and similar to the *Glenelvan*, launched last month for the same owners.

Messrs. Blackwood & Gordon, Port-Glasgow, during the month contracted with the Glasgow, Dublin and Londonderry Steampacket Co. to build for them a steel screw steamer of about 600 tons. This vessel is intended for the company's cattle and goods cross-channel trade and is to be fitted with cattle fittings of the newest type. The engines and boilers will also be supplied by Messrs. Blackwood & Gordon, who have arranged to give early delivery of the vessel.

Messrs. William Hamilton & Co., adjoining Messrs. Blackwood & Gordon's, whose berths have been unoccupied for some considerable time past, are understood to have secured orders for one or two vessels of medium size, and this, together with the contract entered into last month for a steel screw tug for Thames service, should keep a goodly proportion of their usual hands employed for a few months.

Messrs. Murdoch & Murray, Shipbuilders, Port-Glasgow, whose works have been closed for a while, have contracted to build two saloon passenger steamers for the traffic on the river Amazon. They built four vessels of a similar class last year for the same owners. The machinery in each case will be triple-expansion. As these steamers have to perform trips of more than a thousand miles on the Amazon, they will be luxuriously fitted up for passenger traffic. The machinery for one of the vessels will be supplied by Messrs. Lees, Anderson & Co., Glasgow, and that for the other by Messrs. David Rowan & Son, Glasgow.

Messrs. Robert McAlister & Son, Dumbarton, have secured an order to construct a 50-ft. steam launch to have a speed of 10 knots. Messrs. Matthew Paul & Co., of the same town, are to supply the machinery.

Messrs. Caird & Co., Greenock, early in the month laid the keel of a single-screw passenger steamer for the Peninsular and Oriental Co. The vessel, which measures 500 ft. in length, will be the largest in the P. & O. fleet, and is to be named *India*. Messrs. Caird & Co. have two other large steamers on the stocks, in different stages of construction, for the same owners, and they also launched during the past month the *Malla*, of 5,800 tons, similar to the *Simla* and *Nubia*, recently completed for the P. & O. Co.

Messrs. Scott & Co., shipbuilders and engineers, Greenock, secured an order about midmonth to build an engine for

Messrs. Alfred Holt & Co., Liverpool, two steel steamers, each of 7,000 tons carrying capacity for their China trade. The same firm have lately fitted up a saw for cutting out the webs of cranks, the jaws of connecting rods, jaws of eccentric rods, and other work, the operations being attended to by a handy labourer. At an aggregate meeting of the members of the Greenock district of the Amalgamated Engineers' Society this matter has been discussed and protested against. The engineers have no objection to the introduction of the saw, but hold that it should be worked by an engineer. It is stated that the saws are likely to be introduced into other works, and it is held that, owing to the nature of the work done by these machines, no person, unless a tradesman, should be allowed to work them.

At the Ailsa Shipbuilding Co.'s yard, Troon, workmen were kept pretty busy at the beginning of the month preparing for her trial trip the fine steam yacht *Zara*, being built for Mr. Peter Coats, of Paisley. The firm early in the month contracted with Messrs. J. M. Campbell & Co., Glasgow, to build a large barque similar in style to the *Kilmeny*, launched some months ago from the Ailsa shipyard.

The new yacht *Valkyrie*, intended as challenger in the America Cup contest, was safely launched from the yard of her builders, Messrs. D. & W. Henderson, of Meadowside Park, on the 27th ult. While generally built on the same lines as her ill-fated namesake of last year, the new vessel is of larger beam, with a keel shorter, deeper and heavier. Her length is 110 ft., beam 26 ft., the deadweight being about 300 tons, as compared with her predecessor's dimensions of 96 ft. length, 22½ ft. beam, and tonnage 190. The mainmast is to be 96 ft. high without the topmast, and the boom 120 ft. long, extending about 20 ft. over the stern. The area of the mainsail alone will be about 5,000 square feet.

The "limited liability" principle is gradually spreading amongst Clyde shipbuilding firms. Fairfield set others an example in this way some few years ago; later on Messrs. Thomson, of Clydebank, and Messrs. McMillan, of Dumbarton, followed suit, and now there falls to be added to the list of limited companies the firm of Robert Napier & Sons, one of oldest and, in one sense, one of the most historic of shipbuilding firms on the river. The concern, under its new designation of R. Napier & Sons, Limited, has already secured an order, and have substantial prospects of securing several additional orders at an early date.

Messrs. Ritchie, Graham & Milne, of Craigton, Govan, who occupied the small shipyard at Water Row, near Govan Ferry, last year, have decided to occupy the vacant shipyard below Whiteinch, formerly held by Messrs. W. B. Thompson & Co., who removed to Dundee about nine years ago. Messrs. Thompson sloped the ground and laid it out suitable for shipbuilding operations. The new occupiers have already several small orders to execute, one of them being too large to be laid down in the old yard, which has necessitated the change.

In the matter of Clyde steamboat accommodation and facilities, which one would have thought had almost reached the limit for a term of years, there has to be reported a further forward step. Two of the three railway companies have added new steamers to their already numerous fleet, and the other two boats are in the possession of private owners. This latter fact is worthy of special consideration, in so far that it seems to confute the prevalent belief that the large companies were likely to crush private enterprise out of existence. Captain John Williamson, who last season ran the *Benmore* so successfully on special lines, has had the *Glenmore* built to meet the demands of his increasing business; and Captain Buchanan's fleet now includes the *Isle of Bute* (lately the property of the North British Steam Packet Co., and known as the *Guy Mannering*). The North British Co. has replaced the latter with the new steamers, *Redgauntlet* and *Dandie Dismont*, and the remaining fresh addition to the Clyde fleet is the *Duchess of Rothesay* by the Caledonian Steam Packet Co. At the close of last season the Glasgow and South-Western Co. were credited with a resolve to build; but it now appears that they mean to get through another season without addition to their already numerous and handsome steamers.

The Dundee Shipbuilders' Co., Limited, who reopened the shipyard of Messrs. Alex. Stephen & Sons sometime after its having been closed, owing to the decease of Mr. Alex. Stephen, launched, on the 22nd ult., the first ship built in the shipyard under the new proprietary. This was the *Balgay*, of some 800 tons carrying capacity, for the coasting service of Messrs.

William Kinnear & Co., Dundee. After safely entering the water, she was towed to Victoria Dock, where her engines and boilers will be fitted by Messrs. J. and H. Whyte & Cooper. At a cake and wine banquet, which followed the launch, Captain Lindberg, managing director of the Shipbuilders' Co., proposed success to the *Balgay* and her owners, and Mr. William Kinnear congratulated the company on the launch of their first vessel, on the good character of the work, and wished the company increasing prosperity.

Messrs. Caldwell & Co., 180, Elliot Street, Glasgow, for the new battleship *Renown*, launched early in the month at Pembroke, supplied the steering engine of their well-known special type. The rudder actuated by this engine, it is of interest to note, is 18½ tons in weight, and the largest yet fitted to a warship. The engine and rudder are expected to turn the ship in about four and a half times the length of the ship with both screw propellers going ahead, and in three times the length with one screw going ahead and the other astern. The rudder frame, sternpost and stem for the *Renown* were all supplied by the Steel Co. of Scotland, the latter being a massive piece weighing 28 tons, while the sternpost weighs 25 tons.

Messrs. T. S. Molnes & Co., Limited, 41, Clyde Place, Glasgow, have on hand an order from the Admiralty for a number of their well-known patent steam indicators. Sets of these indicators and other engine-room accessories have been supplied to a number of the vessels recently tried on the Clyde for speed, notably the fine new channel steamer *Wicklow*, the latest addition to the fleet of the City of Dublin Steam Packet Co.

The measured mile at Skelmorlie and the Firth of Clyde generally, formed the scene of unwonted activity in the way of speed trials of steamers on 2nd May. On that day as many as six new steamships varying in tonnage from about 100 tons to over 4,000 tons burden went down the Firth on preliminary and official trial trips. The vessels were the City of Dublin Steam Packet Co.'s steamer *Wicklow*, the Scottish Oriental Co.'s steamer *Keong-Wai*, built by the Fairfield Shipbuilding and Engineering Co., Limited, the Austrian Lloyd Steam Navigation Co.'s fine steamer *Cleopatra*, built by Caird & Co., Greenock, the London and North-Western Railway Co.'s steamer *Restorator*, built for the service between Greenore and Holyhead, the splendid passenger paddle steamer *Red Gauntlet*, built by Messrs. Barclay, Curle & Co., Limited, Whiteinch, for the North British Steam Packet Co.'s Clyde service; and a new steel-screw tug named the *Caroni*, built for the Crown Agents of the Colonies for the Port of Spain, Trinidad. The *Keong-Wai* is the eleventh vessel built at Fairfield for the Scottish Oriental Co., and is classed in the highest grades in the Bureau Veritas, also in the British Corporation, and is under the Board of Trade survey. On the measured mile at Skelmorlie a speed in excess of the contract was obtained and the trial was in every way satisfactory.

The amount of laid-up tonnage in the Gareloch is not undergoing any very sensible decrease as time goes on, but it has been reduced by at least two vessels during the month. One is the steamer *Waterloo*, of 1,145 tons, which has been laid up for a long time, and the other the *Navarino*, a still older vessel. The *Waterloo*, has been sold by Messrs. A. C. Gow & Co., to Messrs. Macbeth & Grey, Glasgow. She was built at Glasgow, in 1879, by the London and Glasgow Shipbuilding Co. Her engines are compound surface condensing, of 500 I.H.P. The *Navarino* was formerly owned by the British India Steam Navigation Co., and after having been in disuse for several years has been taken to Dumbarton, where she will be broken up.

For the two new vessels of the Russian Steam Navigation Co.'s fleet now being built in the yards of Messrs. Denny, Dumbarton, and of J. & G. Thomson, Clydebank, Messrs. Baird, Thomson & Co., ventilating engineers, London and Glasgow, are preparing an installation of the "Baird, Thomson" improved system of mechanical ventilation. The company have given the order to Messrs. Baird, Thomson & Co., as the result of the satisfaction with the system as supplied some time ago to other vessels of their fleet. For the same vessels the Linklater Shipfitting Co., Tynemouth, are supplying three of their patent combined raft and deck seats.

The dispute referred to in last month's Notes between the engineers and boilermakers in the yard of Messrs. J. & G. Thomson, Clydebank, in regard to work on tubulous boilers, having been submitted to arbitration, evidence was heard on the 21st ult. by Mr. D. J. Dunlop, of Messrs. D. J. Dunlop & Co., shipbuilders, Port-Glasgow—the arbitrator selected—in the Central Hotel, Glasgow. Mr. Robert Knight, general secretary

of the Boilermakers and Iron Shipbuilders' Society, and a large number of others representing the several parties interested in the matter, were present. A representative from each side opened the proceedings, after which evidence was submitted, and the respective arguments placed before Mr. Dunlop, who intimated that he would consider his decision. The difference between the two classes of workmen, which is the subject of arbitration, originated in connection with the new water-tube boilers being made for *H.M.S. Terrible*, each class claiming the work. The boilermakers claim the work on the ground that it is boilers that are being made, while the engineers—though admitting that boilers are being made—contend that the work being different from that required on boilers previously made and more resembling the work of engineers than of boilermakers should be done by them. In the early stages of the dispute, Messrs. Thomson took the work from the engineers and gave it to the boilermakers, but on the engineers pressing their claim, and even stopping work for a day or two, they withdrew the workmen and neither were engaged on the boilers for some time. The situation was made slightly more acute by the fact that a demand by the engineers for an advance of wages had been settled only a few days previously. After the work had been delayed for some time the parties agreed to submit to arbitration, the engineers being given the work in the interval.

The carpenters in the yard of Messrs. Denny & Bros., Dumbarton, have for some time past expressed dissatisfaction with the system of piecework which has for many years been in vogue in Messrs. Denny's shipyard. The system is general in Dumbarton shipyards, but the carpenters complain that it bears most heavily on their trade, and is in force in almost no other shipyard. Dissatisfaction has existed more or less since the system was introduced, but it is only recently that it was resolved to take action in the matter. A well-attended meeting of the carpenters was held in Dumbarton about mid-month. There was a considerable number of non-society men present, and delegates from Partick and Clydebank were in attendance. After some discussion it was proposed that the voice of the meeting be taken in favour of the abolition or continuance of the piecework system. This was agreed to and the vote taken by ballot, when the meeting declared in favour of abolition by an overwhelming majority. It is understood that the result of the meeting will be intimated to the executive before further proceedings are taken.

As illustrating the petty incidents on which great issues hang now-a-days as regards labour, I may refer to one out of many instances which might be given. The other day in the yard of the London & Glasgow Shipbuilding Co., one of the hammermen, who is alleged to be in the habit of losing time, did not appear at his work until after breakfast. He was not allowed to start work as he had lost considerable time after the last pay. He is alleged, then, to have gone to the other hammerman and persuaded the whole of them to stop work. Their contention was that the man was dismissed not because of his losing time but because he was their delegate and shop steward, so they declined to start unless he too was given work.

Messrs. Douglas, Dick & Co., 11, Bothwell Street, Glasgow, who are agents for the "Providence" crank bronze capstans now so much in favour for yachts, are receiving numerous orders for this speciality, one of the latest received being from Mr. Sibbick, the well-known yacht-builder of Cowes, who is fitting the capstan to the sailing yacht *Nerida*. Messrs. Dick & Co. are also agents for the sale of "Argyrraut," a beautiful incorrodible white metal exquisitely suited for saloon and stateroom fittings. They have just been commissioned by the Clyde Shipping Co. to supply all the saloon and stateroom fittings in two of the vessels belonging to the company. "Argyrraut," it may be mentioned was employed throughout in the magnificent steam yacht *Vallant*, built for W. K. Vanderbilt some years ago by Messrs. Laird, of Birkenhead.

At the half-yearly meeting of the shareholders of the Glasgow Harbour Tunnel Co., held on the 30th April, the chairman in moving the adoption of the report, said the American Elevator Co. had completed the erection of the lifts, and were now testing them with a view of having them in a satisfactory state for being brought into use at an early date. The tunnel crosses under the Clyde at Finnieston, thus connecting the north and south sides of the harbour in the vicinity of the Queen's dock on the north, and the Cessnock dock on the south side. It is anticipated, if no unforeseen difficulties arise, that the tunnel will be opened to the public in June.

At a joint meeting of Greenock Chamber of Commerce and the shipowners and shipbuilders of Greenock and Port-Glasgow held on the last day of April, Mr. Dugald Macdougall, of the Gulf Line Steamship Co., who has held the post for the last 12 years, was again elected to represent the district on Lloyd's Register for a term of four years. Having returned thanks, Mr. Macdougall gave a brief history of the origin and progress of Lloyd's since 1838. It was now composed of 58 representatives, 26 from London, and 32 from the provinces. The funds of the society now amounted to £450,000. The income was £115,000 per annum, and the revenue about £10,000 to £12,000. Mr. Macdougall contrasted the working of Lloyd's with the Board of Trade, and showed how in the former case everything was done satisfactorily, while in the latter it was quite the reverse. They had on the one hand a society composed of commercial gentlemen, and on the other, the Board of Trade, managed by Government officials; the former had an accumulated income of about £500,000, gained bit by bit; the latter, by gross mismanagement had a deficit of many thousands of pounds. Lloyd's was now in a position of doing everything possible to assist the shipbuilder, the shipowner and engineer; the Board of Trade had done nothing towards that end. Mr. Macdougall, in reply to a question, said that probably next year there would be a further reduction in Lloyd's fees, which pressed heavily upon the Clyde, but held out no immediate prospect of increased representation in Scotland. The election of ten representatives from Scotland have since been announced, and are as undernoted:—Glasgow underwriters—Mr. Alexander Mitchell and Mr. Seton Thomson; Shipowners' Association, Mr. G. M. Kerr; sailing shipowners, Mr. T. O. Guthrie; steamship owners, Mr. R. Mackill; Chamber of Commerce, Mr. John Ross; Greenock, Mr. D. McDougall; Leith, Mr. J. Cormack; Dundee, Mr. Charles Barrie; Aberdeen, Mr. A. P. Hogarth.

## TRADE NOTES FROM THE TYNE, WEAR, TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

### THE TYNE.

**Shipbuilding.**—The indications of coming improvement in shipbuilding have become somewhat more pronounced since last month, and among these indications the increased number of inquiries from shipowners is perhaps the most significant. A few orders of more than ordinary importance have been secured, and at one of the yards, where operations have been discontinued for several months, preparations for resuming work have been commenced. There is undoubtedly, a more confident tone in business circles, and we shall expect to see a substantial addition to the volume of shipbuilding work in this district before the advent of winter. The most important event of the month was the launch of the Argentine cruiser from the Elswick yard, which took place on the 10th. The vessel is one of the largest and most costly that have been built at the establishment, and the launch was consequently regarded with more than usual interest. Everything having passed off successfully, the large company of invited guests, were subsequently entertained to a luncheon in the works. The vessel is now being fitted with her machinery and armament, and will, it is expected, in the course of a few weeks be ready for her first trial. Among the various accessories that have been already fitted, are two "Yaryan" evaporators of large power, for producing the requisite supply of fresh water, for boiler feed, and for general purposes on board. These evaporators have now become very popular, and no war vessel has been launched at Elswick during the last three years without a suitable equipment of these very effective fresh water producers. Preparations for laying down another large cruiser are now being made, and the prospect of brisk work in the yard during the remainder of the year is tolerably well assured. Business at the Low Walker Yard of Sir W. G. Armstrong, Mitchell & Co. is now very active, the whole of the building berths being occupied with vessels of various types and dimensions. New plate bending rolls of modern design, and the very largest size, are being put down, and it is expected that by their aid work will be greatly facilitated. Messrs. W. Dobson & Co. have just completed the framing of an exceptionally large vessel, and have other work in

preparation. At Messrs. Wigham Richardson & Co.'s yard there are now but two vessels building, and one of these is ready for launching. It is understood, however, that the firm have other work to go on with. Messrs. Wood & Skinner, who are building a ferry steamer to ply between North and South Shields, have put down the keel for another small vessel, thus causing two out of their four building berths to be occupied.

We are pleased to be able to state that Messrs. Hawthorn, Leslie & Co., have been commissioned to build another high-class vessel of over 6,000 tons displacement, for the Russian Volunteer Fleet. A vessel, which was ordered from the firm for the same destination some months ago, is now well advanced in construction, and it is understood that the building of the more recently ordered vessel will be commenced at once. The firm have supplied a good number of vessels to the great Russian syndicate mentioned, as well as to other leading commercial companies of the same nationality, and no higher testimony could be adduced as to the quality of the work turned out by the firm than the fact of such important commissions being from time to time repeated. The firm have ready for launching a large vessel which is understood to be intended for the New Zealand trade, and the finishing touches, preparatory to launching, are being given to the torpedo destroyers ordered by the Admiralty. Messrs. C. S. Swan & Hunter have, by arrangement with Messrs. Doxford, undertaken to build two "turret" steamers of large size, and one of them is already well advanced in construction.

They have commenced the building of a vessel under the new sheds, which is now practically completed, and is undoubtedly the most conspicuous object to be seen on the river. It is fitted with a novel type of combined overhead traveller and jib crane, worked electrically and serving to deal with all lifts which may be necessary in building even the largest steamers. This interesting appliance is supplied from the electrical department of Messrs. Clarke, Chapman & Co.'s works, and it reflects the greatest credit upon that well-known firm. It has already proved a marked success, and is probably the most unique order in the way of electric motor work that has up to the present been executed by any firm in the country. It is understood that Messrs. Swan & Hunter are about to build a large pontoon dock for the Smith's Dock Co., North Shields, and they have on hand a large steamer ordered by Mr. R. M. Hudson, of Sunderland, which is to have bronze propellers, and will otherwise be equipped in a superior style.

At Messrs. Stephenson's Yard, Hebburn, the 10 barges ordered last month by Russian owners are all in course of construction, and two or three of them are quite ready to be taken to pieces for shipment. The building of the others would have been much further advanced but for a wages dispute at the Jarrow Steel Works, which caused delay in the delivery of material.

**Engineering.**—The order for engines and boilers for the Russian volunteer steamer to be built by this firm at their Hebburn yard, will make a substantial addition to the work in hand at their St. Peter's establishment, where contracts are at present sufficiently numerous to keep most of the departments going night and day. At the North-Eastern Engineering Works, Wallsend, there are two old steamers receiving new or converted machinery, and there is a good deal of other work in hand. The Wallsend Slipway Engineering Works are also well supplied, some of the contracts in progress being of more than ordinary importance.

The Palmer Co.'s engineering department is kept in steady operation, and the same may be said of Messrs. Readhead's works, Tyne Dock; but at some of the smaller marine engine works business is not so satisfactory as could be wished.

Messrs. Clarke, Chapman & Co., Gateshead, are at present well supplied with work, though the effects of severe competition on prices are complained of. They have in hand a large amount of work for Admiralty contracts in capstans and hoisting machinery, as well as the electrical installations on three cruisers. The electrical department is just now specially busy on steamship installations, and also upon electric motor work, of which there is a large quantity in hand. Of this class is the lifting apparatus supplied to Messrs. Swan & Hunter for the new shed over their largest building berth, which has already been referred to.

The Palmer Shipbuilding and Iron Co. have been commissioned to build two steamers of 7,000 tons carrying capacity each for the owners of the "Hall" line of steamers, Liverpool. The company have built several vessels for these owners in



former years, all of which have given great satisfaction, and hence the return of the Liverpool firm to the Jarrow company when they required additional steamers. A fine vessel, ordered by the Peninsular and Oriental Co., is far advanced towards completion, and there are three other vessels on the stocks, while berths are being prepared for others to be laid down. The fitting out of three vessels in the water, and the breaking up of a couple of old steamers, adds materially to the generally brisk appearance of the yard. The yard of the Tyne Shipbuilding Co. continues to be kept very busy, and at the Edwards Co.'s yard, which has been idle for several months, the keel for a vessel has been placed in one of the berths. It is to be hoped that more work will follow, as the stoppage of this yard for so long a period has been a serious misfortune to the locality. At Messrs. Readhead's yard the state of work remains satisfactory, the four building berths being occupied with vessels in the various stages of keel-laying, framing, plating, and preparing for launching. There are also several vessels under repair at the yard, and in the initiatory departments signs of continued activity are apparent. Messrs. Eltringham have two small vessels on the stocks at their shipyard, and in the boiler-works business continues active. There is a fair amount of work in the graving docks, and in one or two instances big contracts are in progress.

The engine works of Messrs. R. Stephenson & Co. are kept in fairly steady operation on locomotive and general work. A good contract for engines, &c., is expected from a foreign source, and, should this be secured, briskness in all the shops will be assured for some months to come.

The principal departments of Messrs. John Abbot & Co.'s works, Gateshead, are kept tolerably busy; but more especially the chain and anchor shops, where there is a good deal of work in hand. A new fitting shop has been added recently, or rather an old one reconstructed with most satisfactory results, so far as regards economical production and increased output capacity. In the ironfounding department there is a large amount of work in hand, principally for Sunderland engineers.

Mr. Thomas Beynon, of No. 9, Dean Street, Newcastle, has taken up the agency for the sale of a new preparation of tannate of soda, specially intended for use in marine boilers, which is manufactured by Messrs. Ralph Rigby & Co., Walsall. This composition is prepared by an improved process which enables the manufacturers to offer it at a lower price than such a preparation has ever before been sold at. Mr. Beynon is sole agent for the North of England, and holds a large stock at the Newcastle depot and at Tyne Dock. It should be added that where this composition is used neither chipping or zinc plates are required. Mr. Beynon is also the local agent for Messrs. Engelbert, and is now selling largely a new engine-oil for lubricating marine and other engines which has just been introduced, and which combines the advantage of exceptional cheapness with excellence of quality. In these days of keen competition, when everything has to be out "low," the enterprise of Messrs. Engelbert in trying to meet the requirements of shipowners and manufacturers will no doubt be appreciated.

Messrs. Raine & Co., iron manufacturers, have just put down a very powerful shearing machine by Messrs. Craig & Donald, of Johnstone, N.B., at one of their rolling mills.

Mr. George Tyzack, of South Shields, continues to do a large business in the manufacture and sale of his well-known patent stockless anchors. At Messrs. Spencer's works, Newburn, business is still pretty active.

Owing to the advance in prices of raw hides, &c., Messrs. George Angus & Co., of the St. John's Leather Works, have found it necessary to apprise their customers that the price of all leather goods shall be raised 10 per cent.

#### THE WEAR.

**Shipbuilding.**—Messrs. William Doxford & Sons have booked a number of orders for "turret" steamers during the past few weeks, and there is little reason to doubt that this type of ship is becoming popular. They have three large ones now on the stocks, and it is understood that there are five or six others to follow. The firm have also received an order from Messrs. Crow, Radolph & Co., Liverpool, for a cargo boat of 11,250 tons carrying capacity; but they will not be able to lay the keel till one of the "turret" ships is launched, and a suitable berth is thereby made vacant. The vessel, which is considerably larger than either of the two exceptionally large steamers which they have previously built for the same owners, will undoubtedly be the biggest cargo

vessel afloat, and it is no small distinction to be entrusted with the building of such a vessel and to be capable of carrying out such a contract successfully.

Messrs. Short Bros. have booked some contracts lately, and business at their yard is sure to be brisk for several months.

In the other yards above bridge there is very little doing, Messrs. R. Thompson & Sons and Messrs. Pickersgill having one boat each, and Mr. Laing having three on the stocks, but all in advanced stages of construction. Among the latter is the successor to the s.s. *General Havelock*, which was lost near Sunderland last year. The vessel, which is handsomely fitted up, was launched on the 26th inst. An extensive piece of ground, which was incorporated with the yard some time ago, is now being levelled and otherwise prepared for adaptation to shipbuilding on a large scale. Vessels of unusually great length can be built on this ground, and it is believed that in time it will be exclusively devoted to the building of such vessels.

At Messrs. Austin's yard there is no new work in progress, although a vessel which is unsold is completed on the stocks. The firm, however, are kept fairly busy in the repairing department. The Strand yard has all the berths empty; but there is some repair work in hand which keeps a portion of the working staff engaged.

Messrs. Blumer & Co. have four vessels on the stocks, only two of which, however, are being proceeded with, the others being "spec" boats, the construction of which it is not desirable to carry on beyond certain limits, until customers have been obtained. The two yards at the South Dock have each but one vessel in progress, and in neither case is there many hands employed.

Messrs. J. L. Thompson & Sons are busily preparing the s.s. *Vega* for delivery to the owners, the Bergenske Damaskibsselskab of Norway. The vessel is sumptuously fitted up for passenger accommodation, and will, we have no doubt, be one of the most successful on the service between the Tyne and Norway. The firm have a good deal of work in the yard, and have just commenced frame turning for a vessel of large size. They have had a good share of repair work lately, one important contract, which is not yet completed, being the overhaul of the s.s. *Freshfield* which was ashore at Buenos Ayres, and was greatly damaged.

The building of ships' boats is a decaying industry, and in Sunderland, where once it flourished, there are now scarcely a dozen operatives employed. It is probable that wood will be entirely superseded by steel, in course of time, as a boat building material, and there is consequently little hope of improvement for the unemployed manipulators of the former. It is not only the introduction of steel boats, however, that has served to destroy the wood boatbuilding trade, but the steady increase in the size of cargo steamers, which has caused fewer boats to be required in proportion to the amount of cargo carried.

**Engine Works.**—At the North-Eastern Engineering Works, South Dock, work is very active, particularly in the boilershops and foundry. The Palmer's Hill Works are kept in steady operation, a considerable amount of repair work having been secured, to supplement the new work, lately. There is now at the works to receive her machinery a large vessel just launched from the yard of Messrs. J. L. Thompson & Sons, Ltd. The fitting with engines and boilers of the British India steamer recently launched from Mr. Laing's yard has occupied a good many hands at the Southwick Engine Works during the last couple of weeks. It is not the first vessel the firm have engaged for the same service, and there can be no doubt that the work in this case will be as satisfactory as in former instances. On the occasion of the trial of the *Turret Crown*, built by Messrs. Doxford to the order of Messrs. Petersen, Tate & Co., of Newcastle, the water-tube boilers (Babcock & Wilcox pattern) with which the vessel is fitted, were subjected to a pretty severe test, which they came through in a most satisfactory manner. With the engines making 73 revolutions per minute, the vessel maintained a speed of nearly 12 knots, not the slightest sign of priming in the boilers being discernible. The heating surface of the boilers is 4,580, and the grate area 111 square feet. We are informed that with these boilers an hour is deemed quite sufficient to get up steam, a feature which, of course, must be looked upon as a great advantage from the points of view of quick dispatch and economical working. The great reduction in weight, as compared with ordinary cylindrical boilers, must also tell in favour of the newer type, which seems bound to make its way in time into general adoption. The "Yaryan" evaporator, with which the vessel is



supplied, worked admirably on the occasion of the trial, making an abundance of pure fresh water, and completely satisfying the engineers in charge, and all other persons on board, who were interested in the working of the machinery.

The engine works, at Wreath Quay, which have been acquired by Messrs. Jamieson & McColl, and been altered and improved to suit the purposes of marine engine building, boilermaking, repairing, &c., are now almost ready for a start being made, and it is probable that part of the machinery will be in operation before the end of the month. Besides the foregoing, the firm intend entering upon the manufacture of winches and other steamship accessories, and will thereby greatly widen their scope of operations. They have received a foreign order for the engineering department, and are in receipt of a good many enquiries for engines, &c., from various quarters.

Mr. William Mills has, since his withdrawal from the partnership known as "Crozier & Mills," devoted his attention to developing the resources of his own works at Brewery Bank, Monkwearmouth. In addition to the manufacture of his patent boat gear, and to the copper-smithing business, which was already under way, he has opened a brass finishing department, which enterprise has proved a marked success, as besides getting a good share of local work, he is cultivating a steadily growing export trade.

The Monkwearmouth Ironworks have been busier lately than for some time previously, a better demand locally for bars and angles having arisen. At the Bloomfield engine works of Mr. A. A. Rickaby business continues fairly brisk, orders for engine packing and other specialties being still pretty numerous. At the Pier Engine Works, belonging to Mr. R. J. Smith, there has been a fair amount of repair work lately, the situation of the works, at the entrance to the South Dock, being highly favourable to the acquisition of contracts.

**The Hartlepoons.**—At this centre shipbuilding continues in a tolerably satisfactory state, though at the leading establishments a number of empty berths are to be seen. Messrs. Irvine & Co. have a number of barges on the stocks. The engineering establishments are well off for work, and it is believed that there is other work in prospect. The steel works are kept going pretty regularly, and in the rope works a fairly brisk state of business is maintained. Timber imports are becoming heavier each week, and employment for labour at the docks is consequently much more plentiful.

**Stockton.**—The shipbuilding yard of Messrs. Ropner & Son is still showing a satisfactory state of briskness, all the berths being occupied with vessels of large size, and the initiatory departments being kept busy. At Messrs. Richardson & Duck's yard business is slack; but at Messrs. Craig, Taylor & Co.'s yard, a worse state of things exists, as there is no work whatever on the stocks. Engineering and bridge works are moderately busy, and at Messrs. Riley Brothers' boiler works quite exceptional activity exists. At the Stockton Forge Co.'s work, orders are numerous and work brisk.

**Middlesbrough.**—The state of the shipbuilding trade at this centre is unchanged since last month; but it is expected that in the case of the leading firm (Sir Raylton Dixon & Co.), some further work will soon be in evidence. Messrs. Westgarth & English, marine engine manufacturers, &c., have a good deal of work in hand, and are likely to be kept busy during the remainder of the year. Foundries are tolerably busy, and steel works are generally better supplied with orders than was the case a month ago. In the docks business is improving, through increased imports of timber.

## THE MERSEY.

(From our own Correspondent.)

THE position in the marine engineering and shipbuilding industries of this district still remains without appreciable improvement. Marine engineers do not report any new work of importance, and much the same applies to shipbuilders, this branch of industry continuing generally quiet. As regards other branches of engineering steady improvement has been going on for the last two or three months. Heavy stationary engine builders are mostly getting full of work, a considerable number of important orders having recently been given out in this district. Machine tool makers also report more enquiry, new

work coming forward more freely, whilst boiler-makers, although many of them are still far from busy, are gradually getting better off for orders, and the outlook all through the general engineering trades of the district is becoming more satisfactory than it has been for some time past.

The returns issued this month by the trades-union organisations connected with the engineering industries again show a steady decrease in the number of unemployed members, and although this scarcely indicates any really marked revival of activity generally, it is evidence of the gradual approach of a more satisfactory state of trade which augurs well for the immediate future. In the Amalgamated Society of Engineers the returns show about six and a-half per cent. of the total membership on donation benefit, which represents a slight reduction as compared with last month's reports. Although in this immediate district the condition of employment improves but slowly there are decidedly more enquiries for workmen, and the number of unemployed members in the Manchester district now only represents eight per cent., as compared with 10 per cent. of the local membership a few months back. With regard to the state of trade the reports received by the different societies from the various districts throughout the country indicate a steady improvement, some branches being in a much better position than they have been for some time past. Marine centres are generally in a more favourable position than they have been, and heavy engineering firms are also securing more work, whilst locomotive builders are obtaining more orders than they have done for some time past. One noticeable feature in this month's returns is the decrease of members on the sick list, which has recently been abnormally high; the percentage is now not much above the average.

Messrs. Laird Brothers, of Birkenhead, have during the month been making rapid progress with the work of fitting on armour plates to the hull of the battleship *Mars*, some 100 tons of armour plates being bolted on to her sides weekly, whilst her machinery in the engine and boiler shops is being rapidly completed. The firm have also launched from their works a specially designed passenger steamer, built for the Blackpool Passenger Steamboat Co., Limited, for their excursion service in connection with the Central Pier. This, which has been called *The Queen of the North*, is a steel paddle-wheel steamer of the most modern type, and is 220 ft. long between perpendiculars, 26 ft. beam, 12 ft. depth, and measuring about 800 tons O.M. She is to have compound surface-condensing engines, with four cylinders, the two high-pressure fixed diagonal and the low-pressure vertical oscillating, working at 130 lbs. pressure, and the speed will be about 20 knots: so that the *Queen of the North* will be one of the fastest excursion steamers on the coast. The passenger accommodation will be ample, consisting of a large open saloon aft, tastefully decorated, and a commodious ladies' cabin, with lavatories, &c., also a captain's cabin and a spacious dining saloon forward with bar at after end. There is also a handsomely decorated smoke-room, and the sponson house contains lavatories, lamp-room, and other deck offices. The bridge deck will form a promenade, and afford seat-room for a large number of passengers, and on this will be placed the steering house, engine, telegraphs, &c. The sides of the vessel aft of the paddle-boxes are built up to the bridge deck so that the space beneath forms a large deck-house, which will afford commodious shelter for deck passengers. The steamer is to be lighted by electricity, and carries an electric search light on the bridge, whilst steam windlasses, after capstan, steam-steering gear, life-boats, and other life-saving requirements will be provided, and throughout the vessel is fitted in the most approved style for first-class passenger service. With regard to the torpedo-boat destroyers built by Messrs. Laird, the *Ferret*, in a three-hours full power trial of her machinery with forced draught, attained very satisfactory results. The vessel went out from Plymouth, and the trials resulted as follows:—Steam boilers, 175 lbs., in engine room, 172 lbs.; air pressure in stokeholds, 4.6 in.; vacuum, starboard, 26.5, port, 26.5; revolutions, starboard, 338.1, port, 334.4; I.H.P., 4,300. The speed attained was 25.5 knots, and the engines worked extremely well, whilst the boilers, which are of the Normand type, generated steam without any indications of priming. The last of the five torpedo-boat destroyers recently built by Messrs. Laird—the *Dragon*—of which a description has previously been given, was on May 7th taken out from Chatham Dockyard, and in trials made in rough weather, over the measured mile on the Maplin Sands, attained the following speeds, first mile, 2 mins. 5½ secs.; second, 2 mins. 14½ secs.;

third, 2 mins. 25 secs.; fourth, 2 mins. 13½ secs.; fifth, 2 mins. 8½ secs.; and the last, 2 mins. 2½ secs.; so that the average speed was 27.4 knots, which was very creditable, considering the wind, and the lopping sea, while she scarcely heeled at all in turning at full speed. After other severe tests, which the vessel went through in a very satisfactory manner, the engineer from the Admiralty expressed his approval of the vessel, and Lord Charles Beresford in going home by Sheerness signalled to the Admiral his complete satisfaction with the *Dragon*. Messrs. Laird Bros. have also received orders for several vessels of the same build and engines as the *Dragon*, but with greater boiler power, and getting into 400 revolutions, and these are expected to attain over 30 knots per hour.

The West Gas Improvement Co., Miles Platting, Manchester, are introducing a special type of hauling capstan, which contains one or two new features. This capstan, instead of being driven by hydraulic power, as is usually the case, is driven by compressed air. The general design of the capstan does not differ much from the ordinary type, except as regards the motor, which is similar to a small double-cylinder engine fitted with Joy's patent valve gear, and completely boxed in, so that no dust can get to the working parts, and the bottom of the chamber forms an oil bath in which the working parts of the engine run. The company have also in hand, for the South African goldfields, the construction of two large air compressors, of their two-stage with intermediate cooler type, one of these being to supply compressed air at 100 lbs. pressure, for driving 10 rock drills, and one for driving 20 rock drills, at the same pressure. The steam engines are compound with Sulzer valve gear, and all the suction and delivery valves of the compressor will be controlled by cams, according to West & Jenkins' patent. Owing to the high price of fuel in the South African district the engines are to be of the most economical type, with surface condensers, and the steam cylinders will be jacketed all over, and carefully lagged to protect them from radiation. The air compressors are being constructed to deliver 93 per cent. of the volume swept through by the pistons, and the intermediate cooler serves to economise the power needed for compression. The West Co., it may be mentioned, have just added to their works a new platers' shop, 192 ft. by 56 ft., for the manufacture of hydraulic mains and air receivers and coal conveyers for gas works.

In the iron trade here the stronger tone reported last month has been fully maintained, and a considerable weight of business has been put through at higher prices, makers of some brands being now well sold for some time ahead. Local pig-iron makers have been securing more business, and their quotations have been advanced, 40s. for forge to 42s. 6d. for foundry, less 2½, being now the general rates for delivery Manchester. District brands are also stronger than last month, and makers are firm at 37s. 6d. for forge to 39s. and 39s. 6d. foundry Lincolnshire, with Derbyshire about 44s. to 45s. net cash, delivered Manchester, although iron in second hands is offered at under these figures. For outside brands fair orders have been booked, and prices, although they have fluctuated somewhat, owing to the movements in warrants, are now generally steady at 43s. 10d. to 44s. 4d. for Middlesbrough, net cash, delivered Manchester, with Scotch iron 46s. to 46s. 6d. for Eglinton, and about 48s. 6d. to 49s. for Gartaherrie, net prompt cash, delivered at the Lancashire ports.

In manufactured iron makers report some increased business, but no materially better prices obtainable. They are, however, firm in holding to their quoted rates and are not disposed to book forward except at an advance on present prices, which remain at £5 to £5 2s. 6d. for bars, £6 12s. 6d., and £6 15s. to £6 17s. 6d. for sheets, and £5 15s. to £6 for hcop, delivered Manchester district, and 2s. 6d. less for shipment.

In the steel trade rather more activity is reported, orders for constructive material having been placed at advanced rates. Hematites are now quoted 52s. 6d. to 53s. 6d. less 2½; billets, £4 5s. net cash for good qualities, and boiler plates, £6 2s. 6d. delivered in this district.

In the metal market there has been a fairly active enquiry, and a further advance in list rates of ¼d. per lb. consequent upon the upward movement in raw material. The list rates for delivery Manchester district are now:—Solid drawn brass boiler tubes, 6d.; brass surface condenser tubes, 7½d.; solid drawn copper tubes, 7½d.; brazed copper gas and steam tube, 7d.; brazed brass gas tube, 6½d.; brazed brass machine tube, 6½d.; brass wire, 5½d.; copper wire, 6½d.; rolled brass, 5½d.; sheet brass, 6½d.; yellow metal bolts, 5½d.; wrought

copper boat nails and rivets, 8½d.; wrought copper tacks, 8½d.; cut copper nails, 7½d. to 9½d. per lb.; and copper bolts, £58 per ton.

Business in the timber trade remains quiet, deliveries have been light, but stocks generally are ample and prices are low. In East India teak the arrivals of both logs and planks have been heavy, and although deliveries have been large, stocks are ample with values declining. Only a small quantity of greenheart has arrived and fair deliveries are reported, but stock continues ample with prices somewhat easier.

In the coal trade business continues slow, with pits only working about three and a half to four days per week, and supplies exceeding requirements as regards all descriptions of round coal. House-fire descriptions continue in slow demand, but prices remain without quotable change, and steam and forge coals also continue in very indifferent request, with prices for these not averaging more than 6s. 6d. at the pit. Contracts for gas coal and locomotive fuel have also been placed at very low figures, gas coals not fetching within 1s. to 1s. 6d., and locomotive fuel is offered at 6d. less than last year's prices, 6s. 6d. to 7s. for gas coal, and 6s. 3d. for locomotive fuel representing the full average figures that would be taken. Engine fuel with the present limited output, moves off fairly well with prices steady, at about 8s. 6d. to 4s. for common, to 4s. 6d. and 5s. for better qualities at the pitmouth.

The shipping trade shows no appreciable change, business continuing very quiet with prices low, ordinary steam coals not averaging more than 7s. 6d. to 8s. delivered at the Garston Docks on the High Level, Liverpool.

## NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

**Barrow-in-Furness.**—The month of May has not been a very eventful one in the shipbuilding and engineering trades of Barrow. The launch of the twin-screw steamer *The Duke of Lancaster*, from the yard of the Naval Construction & Armaments Co., was the occasion of an interesting function, at which many of the directors of the Lancashire and Yorkshire and London & North-Western Railway Co.'s were present, as well as such prominent officials as Mr. Webbe, of Crewe, and Mr. Aspinall, of Harwich, the heads of the locomotive departments of the two companies. The launch was made the occasion of the presentation to Mrs. Armitage, wife of the chairman of the Lancashire & Yorkshire Railway Co., who performed the christening ceremony, of a diamond bracelet, in the form of a shamrock, from the directors of the two companies, and also of a silver enamelled card case, illustrative of Furness Abbey, from the directors of the Naval Construction and Armaments Co. The *Duke of Lancaster* will prove one of the smartest steamers engaged in the channel service, and will be on her station in about a month's time. The Barrow Co. have still on the stocks the first-class cruiser *Powerful*, the two second-class cruisers *Juno* and *Doris*, and the sand pump dredger for the Mersey Dock and Harbour Board. As there is room in the yard for twenty steamers or ships at one time, the yard now naturally looks comparatively empty, and this will be still further noticeable when the *Powerful* is launched. But the market for new tonnage is very quiet, and shipping owners are very slow in placing orders, even although it is known that shipping can now be built much cheaper than at any previous time probably in the history of the trade. It cannot be expected, however, that owners will give out new orders when the shipping trade is so quiet, and when there is not sufficient employment for the tonnage already built. There is, of course, always the inducement to spend money cheaply in the building of the modern type of vessel, knowing that if any shipping trade is doing at all, this class of steamer can be much more economically employed than the old-fashioned type of ship. If there was a prospect that in a given time, not too far distant, there would be a revival in the shipping trade, there cannot be a question that much new tonnage would be built. In the meantime owners of the old type of steamer with compound engines and heavy coal consumption have to look facts fairly in the face, and determine whether their craft is worth transformation by putting in new high-pressure boilers and triple-expansion engines, or whether it would not pay better to

break them up and sell the old material for what it will fetch. One of the two alternatives indeed must be adopted, and in the meantime new tonnage will take its place, but the surest way of ensuring the building of new ships is the demolition of the old ones, which cannot under new conditions be profitably worked. Three strikes have occurred in the Barrow yard during the month. The dockers first of all gave notice last month that they required a revision in their earnings, which the builders saw in some cases represented 40 per cent., while the drillers on the other hand declare that the scale was intended to raise the earnings of those who were practically making no income to speak of at all. The men are still out, and in the meantime the masters have started a full installation for electric drilling, which is working satisfactorily, and they have engaged a large number of non-unionist men. The plumbers struck work because one man who could not produce his indentures was engaged by the company. A strike of engineers engaged on the Belleville boilers for H.M.S. *Powerful*, affecting about 70 men, took place in the middle of the month, against boilermakers on a question as to whether a certain job ought to be done by engineers or boilermakers. These strikes are of only small immediate moment, but they have succeeded in stopping several departments, and may affect others.

The month has seen much progress in the construction of H.M.S. *Powerful*. It is calculated she is 500 tons heavier at present than H.M.S. *Terrible*, launched on the Clyde on May the 27th. The launch of the *Powerful* will probably take place on the 25th of June. Her sheathing is well-nigh completed, and the work of fixing the tail end shafts and the propellers is being proceeded with. The launchways are being prepared, and everything got in readiness for the launch on the date named. There is fully a mile width of water in Walney Channel where the *Powerful* will be launched, and in order to give plenty of room for the big vessel, some dredging operations have been going on in Walney Island. These have now been completed. The *Juno* and *Doris* are well forward in plating, and will be ready for launching in about three months. The Mersey Dock and Harbour Board's sand dredger, which is a very big job, is gradually assuming shape, and will soon be plated. This represents the whole of the work the Barrow Co. has in the shipbuilding department. New orders are being sought for, but there is no prospect at present of new business of any importance. In the engineering department the engines of the *Powerful* are nearly ready, and will be completed in time to be ready for lifting aboard when the cruiser is launched. Her Belleville boilers, about which so much has been said, are gradually being completed. Thirty out of 48 are already built, and the others will be ready by the time they are wanted for the ship. The engineers of the *Juno* and *Doris* are also making headway, as are also the multifarious engines and mechanical appliances for the sand pump dredger. In the course of a few weeks the twin-screw steamer *Duke of Lancaster*, for the Fleetwood and Belfast service, will be equipped for sea and ready for her trials. Her engines and boilers are already on board, and the dock trials will take place early in June. She has to steam 18 knots. The three torpedo-boat destroyers *Sturgeon*, *Skate*, and *Stearfish* are now ready for their official trials. There is reason to believe they will prove themselves to be 28-knot boats.

**Sir James Ramsden.**—The resignation of Sir James Ramsden as managing director of the Furness Railway Co. marks an epoch in the history of Barrow. He was in very many senses the creator of the town and its industries. He originated, amongst other concerns, the Barrow Shipbuilding Co., of which, until its transfer to the Naval Construction and Armaments Co., he was managing director. Sir James is 73 years of age, and has spent a busy life in endeavouring to promote the interests of the Furness district and of the town of Barrow especially. His health is the cause of his retirement from active duty.

**The Shipbuilding Material Trade.**—Orders for plates and shipbuilding sections generally are fairly well maintained, and Barrow makers are busy on orders held for Glasgow, Belfast and Barrow firms. New orders are expected so soon as Admiralty contracts are given out; but it is not expected much trade will be given out on ordinary Mercantile Marine account this year. A second plate mill has been started at Barrow, on which thin plates are being rolled, and it is probable a sheet mill will be put down as well. The strike of bogie men and shearers against the award of Mr. Jeremiah Head, the men declining to start work on the proposed reduction of wages set forth on his list,

has terminated, and the men have returned to work on the terms he laid down. Plates are quoted at £4 15s. per ton.

**The Hematite Trade.**—There have been erratic movements in the hematite market during the month. Speculative buyers placed large orders at fuller prices up to 44s. 3d. per ton, although consumptive sales have not increased. Stocks, however, have been lifted fully 10,000 tons, and although prices receded to 43s. 3d., they are back again at 43s. 10d., and firm at that. There are good prospects on the hematite market, because the demand for Bessemer steel has increased, and there will be a fuller consumption of pig-iron.

## BELFAST TRADE NOTES.

(From our own Correspondent.)

**T**HE condition of the shipbuilding and engineering trades of this district has not materially changed during the past month. Much activity has been maintained in all the departments of the various firms, and with the large programme of work on hand this activity may be expected to continue for some time to come. Most of the ships on the slips are in an advanced state, and the yards present a very full and busy appearance, anyone coming up the river would see a good example of the activity which has always been the characteristic of the place.

By the time this reaches our readers' hands, Messrs. Harland & Wolff will have launched the large cargo steamer they are building for the White Star Line. Her dimensions are 560 ft. long by 64 ft. beam, making her by far the largest cargo steamer in the world. Her deadweight capacity will amount to over 17,000 tons, and she will be capable of accommodating over 1,000 cattle.

According to the above it would appear as if the size of cargo steamers is on the increase, as these large boats seem to be the order of the day, and owners are beginning to find out that they pay much better than the small ones. The White Star liner *Germanic* left here for Liverpool after a very satisfactory trial in Belfast Lough.

This steamer has a record which, for a boat of her class, I think, would be hard to beat. She left Belfast in 1875 to take her station on the White Star Line, and from that time until she was returned to her builders (Messrs. Harland & Wolff) at the end of last year, was regularly at work on the Atlantic, and made no less than 211 round voyages, 422 passages across the Atlantic, or a distance of more than one and a half-million statute miles. The original engines and boilers (by Maudslay, Sons & Field, London), after nearly 20 years' work, have been taken out and replaced by four cylinder triple-expansion engines and boilers to work at 180 lbs. pressure.

The ship has besides undergone a thorough overhaul, fore and aft, and many improvements have been introduced so as to make her practically equal, as regards comfort, to the *Majestic*, and *Ten-tonic* of the same line, which have proved such favourites with the travelling public. The saloon, situated amidships, has been redecorated in white and gold, relieved with teakwood framing, and with handsomely-carved pilasters and capitals, and the table and seating arrangements have been remodelled with small thwartship tables on each side.

The main companion way has all been rebuilt and redecorated in wainscot oak and carved panels, entering upon the saloon deck, which is covered along its entire length with a permanent sun-deck, or awning, on which the lifeboats are placed. This deck is now perfectly clear of boats and ventilators, and will prove a fine promenade, as well as a convenient resort, for the usual amusements indulged in by passengers.

The state-rooms and cabins, &c., both on the main and other decks, have all been redecorated and arranged, and Harland's patent rubber tiling has been introduced to a very large extent in the main entrances, passages, smoke-room, &c., which will, no doubt, contribute to the comfort of travellers.

The pantry, galley, and all culinary arrangements have been re-modelled, and are now practically a duplicate of those in the larger ships of the line. The *Germanic* sailed from Liverpool on her first refit voyage on May 15th, and I am sure that both travellers and the public generally will take no ordinary interest in a ship which, after performing regular passages satisfactorily for 20 years to and from America, is rendered capable of not only competing with the majority

of Atlantic Liners lately built or designed, but far surpassing many of them in comfort and convenience.

Such a history as this must not only be gratifying to the *Germanic's* builders and designers, but also to the owners, Messrs. Ismay, Imrie & Co., Liverpool, who must have taken no ordinary care of the vessel to enable her to maintain her place as one of the favourites of the Atlantic.

The pioneer of the White Star Line, the *Oceanic*, arrived here on May 17th for new engines and boilers. Like the *Germanic*, she is in every way a wonderful ship. Built in 1870, she took her station on the ordinary New York run, but, in 1880, being too slow for that route, she was chartered out to the Occidental Steamship Co. for to run on the Pacific, and from that time until she arrived home to her builders, she has been performing regular passages.

Her owners and builders must have every confidence that her hull is in good condition, or they would not go to the expense of fitting new engines and boilers, and it speaks well for Messrs. Harland & Wolff's work, that a ship after 25 years' service is fit to have new engines and boilers.

Messrs. Harland & Wolff had the fine saloon paddle-steamers, *Slieve Bernagh* and *Slieve Donard*, belonging to the County Down Railway Co., in for their summer overhaul previous to starting the coast service to and from Bangor, Larne, &c.

The s.s. *Lord Charlemont*, of the Lord Line, and s.s. *Dynamic*, of the Belfast and Liverpool Line, were also in for repairs.

By the time this reaches our readers' hands, Messrs. Workman, Clark & Co., Limited, will have launched the large steamer they are building for Messrs. T. & J. Harrison, of Liverpool. She is 450 ft. in length, and over 50 ft. beam, and will carry close on 10,000 tons, constituting her by far the largest ship of Messrs. Harrison's already extensive fleet.

Messrs. Workman, Clark & Co. are also making good progress with the ships they have on hand for the China Mutual Navigation Co. They also have a large steamer on hand for Messrs. Holt, of Liverpool, similar to the s.s. *Sarpedon* and *Hector*, built for them last year by Workman, Clark & Co.

Messrs. Workman, Clark & Co. have the s.s. *Tyrconnell*, belonging to Messrs. Hammond, of Londonderry, which stranded at Portpatrick during the memorable December gale, in for repairs.

The s.s. *Kathleen*, of Mr. Milligan's fleet, was also in for general repairs.

The fine steel four-masted ship, *Goodrich*, of Belfast, built in 1892 by Workman, Clark & Co., is offered for sale at Liverpool. She is of 2,880 tons register, and carries about 4,000 tons deadweight on 22 ft. draught.

**Stern-wheel Steamer.**—The s.s. *Umkusi* left the Thames on May 21st, having on board a stern-wheel steamer, 86 ft. in length by 20 ft. beam, built by Messrs. Yarrow & Co., of Poplar, for the Oceana Co., Limited, for service on the Zambesi, having a draft of 18 inches. The engines are direct-acting horizontal; the boiler, of the locomotive type; displacement, about 40 tons; speed, ten miles an hour. This boat is similar to the *Mosquito* and *Herald*, constructed by the same firm for the British Government, being built in floatable sections, which can be bolted together while afloat.

**Mr. Geo. H. Strong, M.I.N.A.** consulting engineer and marine surveyor, of 52A, Savile Street, Hull, has been appointed surveyor (non-exclusive) for the Hull District, to the British Corporation for the Survey and Registry of Shipping, Glasgow.

**Chain Making.**—At the ordinary meeting of the Civil and Mechanical Engineers' Society, on Thursday, April 25th, a paper was read by Mr. W. Cooper Penn, A.M.I.M.E., on "Chain-Making." A history of iron chain cable-making was given; the first cables used by the English Navy being made by Messrs. Brown, Lennox & Co., at the beginning of the century, and they remained until 1830 the only firm who supplied the Navy with these very necessary articles. The method of manufacture was gone into, and the various proportions of the links that have been adopted at different times was given, and the divers forms used. The paper was well illustrated by diagrams, photographs, and samples of chains, some of which had been tested to destruction for the purpose of showing the soundness of the welds and the quality of the material of which they were made. A discussion followed, in which Messrs.

William C. Street, A.I.C.E., F.R.I.B.A., E. H. G. Brewster, A.M.I.C.E., M.I.M.E., A. C. Moffatt, and A. Williamson took part with others.

**Catalogue.**—We have received a neat cloth-bound volume from Messrs. J. Stone & Co., of Deptford, London, E. It is entitled "Ships' Fittings and Brass Work." It is thoroughly well illustrated. It is businesslike from cover to cover. It opens with a small telegraphic code for the use of customers ordering by telegraph. This contains code words both for customers' enquiries and for the firm's replies. Then follows a note on the recent extensions of the firm's works, and an excellent index to the contents of the book. If anyone wishes to know anything about the fittings of vessels of the Royal or Foreign Navies, or of the fleets of the mail lines, he has only to refer to this index. He will see how these things were best done in 1895. Telegraphs of every kind, steering and engine-room; steering indicators, binnacles, compasses, bells, search-lights for naval and mercantile purposes (such in the latter case as for use in the Suez Canal) are here in great variety. Scuttles of patterns which we have before noticed, and ventilators of every form and suitable for use in any part of a vessel have taken a vast amount of study in elaborating the best designs for various positions. There are sanitary appliances, including baths and state-room, washhand basins to suit all purposes and all classes of passengers. Fittings for boats, sidelights, lamps, capstans, winches, and steering-gears. With the latter we must notice the firm's ingenious rudder brake. This not only saves a noise which is most irritating to passengers, but it also tends to save wear and tear of the pintles. Finally we have the various alloys for which Messrs. Stone are so favourably known. The volume will be useful generally as showing the constant improvements which are so steadily being made in the direction of increasing comfort and safety at sea, and at the same time in lessening the cost of fittings to those who have to pay for the luxuries which modern travellers demand, whilst it will be invaluable to the large and increasing body of firms who deal with Messrs. Stone & Co.

**Stern-wheel Shallow-draft Gunboats.**—The s.s. *Buccaneer* has lately left the Thames, having on board four stern-wheel shallow draft gunboats, constructed for the Portuguese Government by Messrs. Yarrow & Co., of Poplar. Three of these vessels were constructed in floatable sections, so that they could be connected together and started within a few days after their arrival in East Africa. The fourth one was in small pieces, arranged for transport overland to the interior on the backs of natives. Two of the gunboats are for service at Lourenco Marques and two for Inhambane. These vessels are 89 ft. in length by 18 ft. beam. Those for Lourenco Marques will have a draft of 18 in. with steam up, and are named *Lacerda* and *Serpa Pinto*, and the remaining two for Inhambane are named *Capello* and *Ivens* and will have a draught under the same conditions of 14 in.

**A Wonderful Steamship.**—The White Star steamer *Oceanic* arrived in Plymouth last month from Hong Kong and Singapore. The *Oceanic* was the pioneer steamer of the White Star fleet. She was launched on the 27th August, 1870, and has therefore been afloat a quarter of a century. It is given to few ocean steamers to do such marvellous work as the *Oceanic* has done. Coming as an entirely new departure, the veritable type of the modern passenger liner, with saloon and staterooms amidships, and other innovations, she ran 33 voyages with great success, and achieved a high reputation for speed and comfort in the Liverpool and New York trade. She was then sent out in April, 1875, just 20 years ago, to the Pacific, to run between San Francisco and Hong Kong under charter to the Occidental and Oriental S.S. Co., of San Francisco. At the end of 1879 she came home to be re-boilered, returning to her station in March, 1880, since when she has not once been taken off, but has continued uninterruptedly performing her work with regularity and efficiency, and has been the most popular steamer on the Pacific. The *Coptic*, which until recently, was employed in the trade between London and New Zealand, has gone to the Pacific to replace the *Oceanic*. The other White Star steamers running in the Trans-Pacific trade are the *Gaelic* and *Belgic*. The *Oceanic* was designed and built by Messrs. Harland & Wolff, Belfast, from whose yard have proceeded the whole of the steamers of the White Star fleet.

## LAUNCHES AND TRIAL TRIPS.

## LAUNCHES.—ENGLISH.

**Robin and Wren.**—On April 22nd there was launched at Hull, by Earle's Shipbuilding Co., two new steel screw steam trawlers, built for the Pioneer Steam Fishing Co., Limited, to the order of Messrs. Moodys & Kelly, of Grimsby. These boats are 93 ft. 6 in. long, 20 ft. 6 in. beam, and 10 ft. 6 in. depth of hold, being generally similar to the *Blackbird* and *Swift*, constructed for the same owners last year. The engines are of the triple compound, three crank pattern, and the vessels were named the *Robin* and *Wren*.

**Cairnlock.**—On April 24th Messrs. Short Bros. launched at Sunderland a steel screw steamer, built to the order of Messrs. Cairns, Young & Noble, of Newcastle-on-Tyne, for their Cairn line of steamers. The vessel is of the following dimensions:—Length, 255 ft.; breadth, 36 ft. 9 in.; and depth, moulded, 20 ft. 4 in., with a deadweight carrying capacity of about 2,400 tons. She is classed 100 A1 at Lloyd's, and is to be fitted with triple-expansion engines and boilers by Messrs. Black, Hawthorn & Co., Limited, Gateshead. Miss Edith Lyle Cairns performed the ceremony of naming the vessel the *Cairnlock*.

**Obra.**—On April 25th a steel schooner-rigged steamer of 5,240 tons gross was launched at Sunderland, owned by the British India Steam Navigation Co.; port of registry, Glasgow.

**Rakala.**—On April 25th Messrs. Hawthorn, Leslie & Co. launched a large steamer at Hebburn-on-Tyne. The dimensions of the vessel are 435 ft. by 54 ft. by 32 ft. She is built to the order of the New Zealand Shipping Co., of London, for their Australian trade, and specially fitted for carrying frozen meat. She is classed at Lloyd's 100 A1. The machinery consists of a set of triple-expansion engines, capable of indicating upwards of 3,000 I.H.P. The vessel was named *Rakala*.

**Dinsdale.**—On April 25th Messrs. Philip & Son launched at Dartmouth a ketch yacht of 86 tons, built to the order of Mr. C. G. Dixon Johnson, of Croft, North Yorkshire. She was named the *Dinsdale*, and her dimensions are: 72 ft. between perpendiculars; 17 ft. beam; 10 ft. 4 in. depth of hold, and 9 ft. draught.

**Granby.**—On April 25th Messrs. Ropner & Son, of Stockton, launched a steel screw steamer of the following dimensions, viz.:—Length between perpendiculars, 270 ft.; breadth, 39 ft. 6 in.; moulded depth, 17 ft. 2 in., which they have built for a West Hartlepool firm. The steamer is built on the part awning decked rule, having poop and raised quarter-deck, her deadweight carrying capacity being 2,550 tons on 16½ ft. The saloon and cabins for the captain and officers are fitted on the poop, whilst the engineers are accommodated in iron houses placed on the awning deck near the entrance to the engine-room. She is built on the web-frame principle, leaving the holds entirely clear for cargo, and carries her water ballast in a cellular bottom and in the after peak. All labour-saving appliances are fitted for the economical working of the steamer, and also for the expeditious loading and unloading of cargoes. She has steam steering gear amidships and screw gear aft, four powerful steam winches, two large donkey boilers working at the same pressure as the main boilers, patent windlass, stockless anchors, &c. The engines will work up to about 700 effective H.P., and are by Messrs. Blair & Co. They are of the triple-expansion type, having cylinders 19 in., 31½ in. and 51 in. by 36 in. stroke, steam being supplied by two large steel boilers working at 160 lbs. pressure. The vessel was named the *Granby* by Mrs. Robert Ropner, jun.

**Grenadier.**—On April 25th there was launched on the Tyne the screw steamer *Grenadier*, built to the order of the Tyne Steam Shipping Co., to replace the old steamer *Grenadier*. The steamer is 240 ft. in length by 30 ft. beam by 17 ft. deep, and will be rigged as a three-masted fore-and-aft schooner. She will have very comfortable accommodation for 56 first-class passengers on the main and saloon decks, which will be in style and finish fully equal to that of the *New Londoner*. It will include a large saloon in polished oak, a smoke-room, a ladies' room, and state-rooms, with the usual lavatories, &c. The second-class passengers, 16 in number, will be placed on the main deck under the topgallant-forecastle, in two well-furnished rooms, one for ladies and the other for gentlemen. The vessel will also be fitted with electric light, steam heating, and with everything to ensure the comfort of the passengers and the

rapid loading and unloading of the cargo. The engines and boilers are expected to propel the vessel when laden at a speed of between 13 and 14 knots.

**Mathilda.**—On Thursday, April 25th, Messrs. Wm. Gray & Co., Limited, launched a large steel screw steamer, which has been built to the order of Messrs. J. Christensen & Co., of Bergen, Norway. She will take the highest class in Lloyd's and also in the Norske Veritas Registries, and is of the following dimensions, viz.:—Length over all, 336 ft.; breadth, 47 ft.; depth, 27 ft. 4 in., with long bridge and topgallant fore-castle. A handsome saloon, state-room, captain's room, &c., will be fitted up in a large deckhouse amidships. The officers' and engineers' accommodation will also be on the bridge deck, and the crew's berths in the fore-castle. The hull is built with web frames, large hatchways are fitted, steam winches, steam steering gear amidships, and screw gear aft, patent direct steam windlass, two donkey boilers, cellular double bottom for water ballast, shifting boards throughout, stockless anchors, telescopic masts, with fore-and-aft rig, boats on beams overhead, and a complete outfit will be provided for a first-class cargo boat. First-class triple-expansion engines are being supplied by the Central Marine Engine Works of Messrs. William Gray & Co., Limited, having cylinders 24 in., 38 in., and 64 in. diameter, with a piston stroke of 42 in., and fine large steel boilers with a working pressure of 160 lbs. per square inch. The vessel and machinery have been constructed under the superintendence of Mr. John Black, and the ceremony of naming the vessel *Mathilda* was gracefully performed by Mrs. Christensen, wife of the managing owner.

**Ockenfels.**—On Saturday, April 27th, Sir Raylton Dixon & Co. launched from the Cleveland Dockyard, Middlesbrough, the fine spar deck steamer, *Ockenfels*, which has been built to the order of the Hansa Steamship Co., Bremen. This is the fifth vessel Sir Raylton Dixon & Co. have launched for the same owners within the last two years. The principal dimensions are:—Length, 352 ft.; breadth, 44 ft.; depth, moulded, 29 ft. 7 in.; and she is built to Lloyd's highest class. The spar-deck is of steel, sheathed with teak, main deck of steel, and the poop, bridge, and fore-castle decks are of teak. Her deadweight-carrying capacity is about 5,500 tons. The accommodation for the captain, officers, and engineers is amidships, and very handsomely fitted. The vessel will be fitted with Sidgwick's patent hinged topmasts, so that they can be readily lowered when required. Triple-expansion engines will be supplied by Messrs. T. Richardson & Sons, Limited, Hartlepool, having cylinders 25 in., 39 in., and 67 in., by 45 in. stroke, with two large single-ended steel boilers, working at 180 lbs. pressure. The steamer on leaving the ways was named *Ockenfels*.

**Nordhvalen.**—On Saturday afternoon, April 27th, Messrs. Richardson, Duck & Co. launched from their building yard a steel screw steamer of the following dimensions:—Length over all, 342 ft.; beam extreme, 43 ft.; depth moulded, 29 ft.; tonnage gross, 8,250 tons. This steamer, which has been built for the Dampskibs Selakabet "Norden" (Mr. Peter Brown, managing director), of Copenhagen; will class 100 A1 at Lloyd's, and has been built under special survey. She is of the spar-deck type with break poop aft, bridge over engines and boilers, and a break fore-castle. Captain and officers' accommodation is amidships in 'tween decks, engineers are berthed in a deckhouse abaft bridge, and crew in fore-castle. A cellular double bottom for water ballast is fitted throughout, and the vessel has provision for additional water ballast in a large deep tank abaft engine room bulkhead and also two large peak tanks. The equipment includes five steam winches, large donkey boiler, steam windlass, stockless anchors and all modern appliances for facilitating loading and discharging. The engines by Messrs. T. Richardson & Sons, Limited, Hartlepool, are of 1,000 I.H.P., steam being supplied by two boilers to work at 160 lbs. pressure. As the vessel was leaving the ways she was christened *Nordhvalen* by Mrs. C. J. Bagley, of Hartburn, Stockton.

**Trevarrack.**—On April 30th there was launched from the shipbuilding yard of Messrs. J. Readhead & Sons, West Docks, South Shields, a new steel screw steamer of the following dimensions, namely:—Length, 284 ft.; breadth, 39 ft.; depth, moulded, 19 ft. ½ in. The vessel is intended for general trade, is of the partial awning deck type, and is fitted up with all the latest improvements for rapid loading and discharging of cargo. Her engines, also built by Messrs. Readhead & Sons, are of the



triple-expansion type, having cylinders of 20½ in., 33½ in., and 55 ins. diameter, and 36 in. stroke, steam being supplied from two largest steel boilers, working at a pressure of 160 lb. per square inch. The steamer has been built for Messrs. Edward Hain & Sons, St. Ives, Cornwall, and is the 29th vessel built by Messrs. John Readhead & Sons for the same owners. She is named the *Trevarrack*.

**Queen of the North.**—On April 30th Messrs. Laird Bros. launched at Birkenhead a paddle steamer, specially designed and built to the order of the Blackpool Passenger Steamboat Co., Limited, for their excursion service in connection with the Central Pier, Blackpool. The new steamer, which was named *Queen of the North*, is 220 ft. long between perpendiculars, has a beam of 26 ft., and a depth of about 12 ft., and measures about 800 tons, O.M. She will be fitted with compound surface-condensing engines.

**Harcalo.**—Messrs. Pickersgill launched at Southwick last month a steel screw steamer, built to the order of London owners, of the following dimensions:—Length, 295 ft.; breadth, 42 ft. 3 in.; depth, 17 ft. 2 in.; and she will take the highest class at Lloyd's. The engines were built by Messrs. George Clark, Limited, and are of the triple-expansion type, having cylinders 22 in., 36 in., and 59 in., with 39 in. stroke. The vessel was named the *Harcalo*.

**Steel Screw Tug and Tender.**—Messrs. Rennoldson & Sons launched at South Shields last month a steel screw tug and tender, which has been built to the order of Messrs. Constantine Svorono & Sons, Kertch, and is intended for service in connection with their extensive shipping trade there. This vessel, the dimensions of which are 100 ft. by 18 ft. by 9 ft., is being fitted with a single-screw triple-compound engine of 300 I.H.P., with a steel tubular boiler working at 160 lbs. pressure.

**Ice Breaker.**—On May 7th there was launched from the Walker shipyard of Sir W. G. Armstrong, Mitchell & Co., a powerful ice breaker, which is intended to be employed in conjunction with a railway ferry steamer, also building in the same yard, in carrying railway trucks across the river Volga. The vessel is 150 ft. long, and 36 ft. beam, and will be fitted with twin-screw engines of 1,400 H.P. In consequence of the canal locks through which the vessel must pass between St. Petersburg and the Volga being only 28 ft. wide, the vessel being 36 ft. beam, she has been constructed on Swan's patent divisible principle, whereby the vessel can be readily divided into two parts longitudinally, and subsequently rejoined afloat. The frames are very closely spaced, and in the bow they are doubled, and a great deal of the shell plate is as much as an inch thick. The vessel will be fitted with electric light, including a projector.

**Charterhouse.**—On May 8th Messrs. Priestman & Co. launched at Southwick a steel screw steamer, for Messrs. Galbraith, Pembroke & Co., London, of the following dimensions:—Length, 386 ft.; breadth, 45 ft. 6 in.; depth, moulded, 26 ft. 1 in. The vessel is constructed to Lloyd's highest class, and is described as being of an entirely new type, being really a spar-decked steamer with heavier scantlings, but having no deck laid below the top one, thereby leaving clear holds for the quick working of cargoes. The engines and boilers are being constructed by Messrs. Wm. Allan & Co., of Sunderland, the engines having cylinders 24 in., 38 in., and 64 in., with 42 in. stroke. The vessel was named *Charterhouse*.

**Novembre.**—On Wednesday, May 8th, there was launched from the yard of the Tyne Iron Shipbuilding Co., Limited, of Willington Quay-on-Tyne, a steel screw steamer built to the order of Messrs. Aznar & Co., of Bilbao, and of the following dimensions, viz.:—Length, 845 ft.; breadth, 44 ft.; depth, moulded, 23 ft. 8 in., and to class 100 A1 at Lloyd's on the spar-deck rule. This vessel has water ballast fitted right fore and aft on the cellular system, and is also fitted with all modern improvements for the rapid loading and discharging of cargo, including six double cylindered steam winches, direct acting steam windlass, large high pressure donkey boiler, steam steering gear by Messrs. John Hastie & Co., of Greenock, and Hastie's screw gear aft. The engines, which are to be supplied by John Dickinson, Esq., of Sunderland, are of the triple-expansion type, having cylinders 24 in., 40 in. and 64 in. by 24 in. stroke, and working at a pressure of 160 lbs. On leaving the ways the vessel was named the *Novembre* by Miss Mabel Dickinson, daughter of Mr. William Dickinson, Healy Hall, Riding Mill. Among those present at the launch were the

Messrs. Aznar, of Bilbao, and their superintendent, Captain Uribe, under whose inspection the vessel has been built.

**Duke of Lancaster.**—On May 9th the Naval Construction and Armaments Co. launched at Barrow the twin-screw steamer *Duke of Lancaster*, built to the order of the Lancashire & Yorkshire and London & North-Western Railway Co.'s. The vessel is intended for their Fleetwood and Belfast service, and is the third of her class to go on the route. The new vessel is 310 ft. long by 37 ft. by 17 ft. 6 in., and she is certified for 800 passengers. The machinery will be capable of driving the vessel at an average speed of 18½ knots.

**Middleton.**—On Thursday, May 9th, Messrs. William Gray & Co., Limited, launched a handsome screw steamer which they have built for the Middleton Steamship Co., Limited, of Hull (Messrs. H. Samman & Co., managers). Her principal dimensions are:—Length over all, 314 ft.; breadth, 44 ft.; and depth, 23 ft. 2 in., and her class will be the highest at Lloyd's. The deck erections consist of a half poop, bridge and forecastle, and the rig is fore and aft schooner with telescoping topmasts. Very tasteful cabin accommodation will be provided under the poop, consisting of saloon, state-room, captain's and officers' rooms. The engineers' quarters amidships and the crew's berths forward. The sides of the vessel are supported by strong web frames, taking the place of hold beams as far as possible, and leaving a clear hold for stowing bulky goods. A cellular double bottom is fitted, and also an after-peak tank for water ballast, while the steam windlass, steam steering gear amidships, screw gear aft, steam winches, patent donkey boiler and the whole of the outfit are of the most approved description. The machinery for the vessel will be supplied by the Central Marine Engine Works of William Gray & Co., Limited, the engines being of the triple-expansion type with three inverted cylinders 28 in., 36½ in. and 62 in. diameter, and a piston stroke of 39 in. to receive steam from two large steel multitubular boilers working at a pressure of 160 lbs. per square inch. The vessel and machinery have been constructed under the superintendence of Mr. Walter Sage, of Hull, on behalf of the owners. The ceremony of naming her *Middleton* was gracefully performed by Miss Samman, daughter of the managing owner.

**Josephine.**—On Thursday, May 9th, there was launched from the yard of Messrs. C. S. Swan & Hunter, Wallsend-on-Tyne, a steel screw steamer built on fine lines to carry about 7,000 tons deadweight on an average speed of 11 knots at sea to the following dimensions:—Length, between perpendiculars, 400 ft.; breadth, 47 ft.; depth, moulded, 31 ft. 6 in.; and to be fitted with engines 27 in., 44 in., and 71 in. by 51 in. stroke, with two boilers 14 ft. 6 in. by 17 ft., and one auxiliary boiler 10 ft. 6 in. by 10 ft., 170 lbs. working pressure, by the Wallsend Slipway and Engineering Co., Limited. The vessel was gracefully named *Josephine* by Mrs. Campbell, wife of the Consul of Newcastle for the United States.

**Ivy.**—On May 9th Messrs. Earle's Shipbuilding & Engineering Co., Limited, launched from their yard at Hull a splendid composite armed yacht named the *Ivy*, which they are constructing for the service of H.B.M. Niger Coast Protectorate. She is classed 100 A1 at Lloyd's, and has teak planking on steel frames, her dimensions being 204 ft. between perpendiculars, by 34 ft. beam, by 16 ft. 6 in. depth, and she is divided by watertight bulkheads into nine separate compartments. A teak deckhouse 130 ft. long and 20 ft. wide, containing the principal state-rooms, is built on the upper deck, and its top is extended to the sides of the vessel to form a spacious shade deck. The main saloon is on the lower deck, where also are situated the bath-rooms, crew's quarters forward, and a large cold store chamber and refrigerating apparatus aft. There will be a complete installation of electric light, and a search-light projector. Her machinery is on the triple compound three crank principle, driving bronze twin screws, and steam is supplied from two steel boilers, to work at 150 lbs. pressure. The launching ceremony took place before a large representative gathering, which included the Agent-General (Sir A. Jephson, R.N.) and Lady Jephson, Sir Frederick Seager Hunt (Chairman of Earle's Co.) and Lady Seager Hunt, Capt. Vardley Wilmot, R.N., Mr. W. James, N.C.P., Mr. and Mrs. A. E. Seaton, and Messrs. J. & J. A. Thompson, naval architects, of London, the designers of the vessel.

**Buenos Aires.**—On May 10th Messrs. Armstrong, Mitchell & Co. launched at Newcastle the cruiser *Buenos Aires*, built for



the Argentine Government. The vessel's dimensions are:—Length, 396 ft.; breadth, 47 ft. 2 in.; draught, 17 ft. 7 in.; displacement, 4,500 tons. She is constructed of steel. The vessel is fitted with twin-screw machinery 17,000 H.P., and it is expected that this will give her a speed of 24 knots.

**Beechwood.**—On May 11th Messrs. Cochrane & Cooper launched from their yard at Grovehill, Beverley, a new steam trawler which has been built to the order of the Northwold Steam Fishing Co., Limited, Grimsby, and is of the following dimensions, viz.:—93 ft. between perpendiculars by 20 ft. 6 in. by 11 ft. depth of hold, and will be fitted with 35 N.H.P. triple-expansion engines, which are being constructed by Messrs. Amos & Smith, of Hull. The vessel will be fitted with all the latest improvements for trawling. On leaving the ways the vessel was named the *Beechwood* by Mrs. W. C. Brown, of Appleby, Doncaster.

**Penguin.**—On May 11th an iron steam ketch, of about 151 tons, named the *Penguin*, was launched at Hull, owned by Pickering & Haldane's Steam Trawling Co.

**Turrethill.**—On May 11th this vessel was launched from the yard of Messrs. William Doxford & Sons, Limited, of Sunderland, having been built to the order of the Broomhill Coal Co., Newcastle.

**Suffolk.**—On May 13th a paddle steamer, named the *Suffolk*, was launched at Hull for the Great Eastern Railway Co. This vessel has been designed and built for river traffic between Harwich and Ipswich, and for short excursions to sea in the vicinity. Her dimensions are:—Length, 165 ft.; breadth, 21 ft. depth in hold, 7 ft. 3 in. She is built of steel to the Board of Trade requirements for this class of steamer, with a flush upper deck, all fore and aft, the deck saloons extending the full width of the ship, as well as over a great portion of the length, and above these is a promenade deck, carried also over the engine and boiler rooms. The ship was launched with machinery on board complete, and steam up, and she made a short run on the Humber prior to being berthed in the Victoria Dock.

**Baron de Neve de Roden.**—On Thursday morning, May 16th, Messrs. Cochrane & Cooper launched from their yard at Grovehill a handsomely modelled steam trawler built to the order of the Societie Anonyme des Pecheries Ostendaises, Ostend, and which is of the following dimensions: Length, 101 ft. 9 in.; beam, 20 ft. 6 in.; and 11 ft. depth of hold. The vessel will be fitted with triple-expansion engines of 59 N.H.P., which are being supplied by C. D. Holmes & Co., of Hull. On leaving the ways the vessel was named the *Baron de Neve de Roden* by Mrs. Cochrane, of Beverley, wife of the senior partner in the firm.

**Borneo.**—On May 23rd there was launched from the Jarrow yard of Messrs. Palmer's Shipbuilding and Iron Co., Limited, a finely-modelled screw cargo and passenger steamer, of the following dimensions, viz.:—Length, between perpendiculars, 400 ft.; beam, 46 ft. 6 in.; moulded depth, 31 ft. The vessel is of the three-deck type, with poop, bridge and fore-castle, and has been built under special survey to class 100 A1 at Lloyd's, and to comply with the Admiralty requirements for transport service. The upper and main decks are of steel and wood-sheathed all fore and aft, and the lower deck is laid throughout the cargo holds. A double bottom is fitted on the cellular system for water ballast, extending all fore and aft, and the hull is subdivided by a large number of watertight steel bulkheads. Spacious accommodation for fifty to sixty first-class passengers is provided in the bridge-house, and will be handsomely and comfortably fitted and ventilated throughout in a manner suitable for service in warm climates. Comfortable accommodation is fitted in the poop for forty to fifty second-class passengers. The officers and engineers are berthed along the sides of the bridge-house, and the crew in the topgallant fore-castle. The vessel will be fitted with all the most modern improvements, including steam cranes, winches, &c., for rapid loading and discharging, and will be lighted throughout by electricity. She is designed to load about 6,000 tons dead-weight on Lloyd's summer freeboard. As the vessel left the ways she was christened the *Borneo* by Miss Angove, daughter of Captain Angove, commodore of the P. & O. Co., London.

**Eddystone.**—On Saturday afternoon, May 25th, Messrs. Richardson, Duck & Co. launched from their yard a steel screw steamer of the following dimensions, viz.:—Length over all,

300 ft.; beam, 42 ft.; depth, moulded, 20 ft.; gross tonnage, 2,330 tons. This vessel, which has been built for Messrs. Farrar, Groves & Co., of London, will class 100 A1 in Lloyd's register, and has been built under special survey. She is of the part awning deck type, captain and officers being accommodated in half poop, engineers in 'tween decks abaft engine casing, and crew in fore-castle. A double bottom throughout, and after peak tanks are fitted for water ballast, and the equipment includes four steam winches, large donkey boiler, steam windlass and steering gear, stockless anchors, etc., etc. The engines are by Messrs. Blair & Co., cylinders 22 in., 36 in., and 59 in. by 39 in. stroke, steam being supplied by two single-ended boilers working at 160 lbs. pressure. The christening ceremony was performed by Miss B. Wood, of Coxhoe Hall, Durham, who named the vessel *Eddystone*.

**Fernfield.**—On Saturday, May 25th, Messrs. Furness, Withy & Co., Limited, launched from their shipbuilding yard at Hartlepool a large steel screw steamer, built to the order of F. Woods, Esq., London. The vessel is a substantial type of a modern cargo boat, measuring over 340 ft. in length and built throughout of Siemen's Martin steel, with a large measurement and deadweight capacity, and is built to the highest class at Lloyd's. Every care has been taken in designing this vessel to construct her as strong as possible for the heavy deadweight trade. The vessel is built on the web-frame system, with cellular double bottom all fore and aft, subdivided at intervals, the after peak being also available as a tank. The main and fore holds are divided by iron watertight bulkheads efficiently stiffened by an iron longitudinal division. The greater portion of the shell plating is in 24 ft. lengths, and is efficiently backed up by strong sectional framing to the top of the vessel all fore and aft, the topsides being extra thick to withstand the heavy Atlantic trade. The bottom plating is also thicker in way of the ballast tanks to allow of the vessel lying aground whilst loading. The whole of the weather decks, tank top, floor plates, &c., are also of extra thickness, and the hatchways are of extra size to take in the bulkiest cargo. Large winches to hatches, patent steam steering gear amidships with hand-gear aft, steam windlass, large donkey boiler, and patent stockless anchors are fitted. The vessel will be rigged as a pole-masted schooner, and to make her available for bridge and canal work the topmasts are telescopic. The engines and boilers have been constructed by Messrs. Blair & Co., Stockton-on-Tees, and are of massive design with every provision for economical working. The ship and engines have been constructed under the supervision of Mr. C. Sage and Captain McFee on behalf of the owners. On leaving the ways the vessel was gracefully christened *Fernfield* by Miss Mollie Sivewright.

#### LAUNCHES.—SCOTCH.

**Revenge.**—On April 26th there was launched by Messrs. Hawthorns & Co., for London owners, a steam tug of 400 H.P. Provision is made on board for a number of passengers. She was named *Revenge*.

**Vigilant.**—On April 29th there was launched by Messrs. Cumming & Ellis, at Inverkeithing, a steel barquentine, 145 ft. by 27 ft. by 12 ft. 2 in., built to the order of German owners. The vessel is designed to carry 600 tons on a draught, of 11 ft. 4 in., and was named *Vigilant*.

**Rebecca.**—On April 29th Messrs. John Fullerton & Co. Paisley, launched a steel screw steamer of 400 tons, named *Rebecca*, built for the Carnarvonshire and Monmouthshire Steam Shipping Co., Limited, for their trade between Liverpool and Port Madoe.

**Barges.**—On May 2nd Messrs. Fleming & Ferguson, shipbuilders and engineers, Paisley, launched from their yard two steel barges, being the first portion of the order for dredging plant which they are executing for the Admiralty in connection with the improvement of Gibraltar Harbour.

**Caledonia.**—On May 6th a steel twin-screw passenger steamer was launched on Lochawe in presence of a large company. As she glided down the ways she was named the *Caledonia* by Mrs. Campbell, of Dunstaffnage. She is 80 ft. long, 14 ft. beam, and is supplied with surface-condensing compound engines. Her passenger accommodation includes a handsome saloon, and she has been built for Mr. Thomas Cameron, Portsonachan Hotel, whose present steamer is too

small for the growing traffic. A large company was afterwards entertained to luncheon, Mr. D. M'Nicol, Unionist candidate for Argyllshire, being in the chair. The contractors for the vessel, Messrs. Bow & MacLachlan, Paisley, first built the vessel there, and after being taken down she was rebuilt on the shores of Lochawe by the same firm.

**Barcelona.**—On May 7th Messrs. Connell & Co. launched on the Clyde a steel screw steamer, 390 ft. by 46 ft. by 31½ ft., which they have built on Spanish account. She is built to Lloyd's highest class, and is fitted with engines having cylinders 30 in., 48 in., and 78 in. by 54 in. stroke. Messrs. Dunsmuir & Jackson, Govan, supply the machinery. She was named *Barcelona*.

**General Alava.**—On May 8th there was launched from the shipbuilding yard of Messrs. Archd. M'Millan & Son, Limited, Dumbarton, a steel screw transport steamer of dimensions, 212 ft. by 30 ft. by 18 ft. 9 in., which has been built to the order of the Spanish Royal Government. This vessel is intended for the transport service of the Government amongst the Philippine Islands, and has been specially constructed and fitted for this purpose. She has a teak upper deck, on which are situated large deckhouses containing the saloon and commander's and officers' apartments. The lower deck aft is entirely occupied with the state-rooms required for the transport service, and forward there is accommodation for petty officers, crew and troops. The commissary department is also on this deck forward. The machinery, which is on the triple-expansion principle, is being supplied by Messrs. David Rowan & Son, Glasgow, and embodies all the latest improvements and appliances for the efficient working of the ship. Provision has been made for the carrying by the vessel of a sufficient armament when on her station, and the necessary magazine accommodation has been provided in the fore hold. As the vessel moved off she was christened *General Alava* by Signora Donna Teresa Garcia de Talero, wife of Captain Ramon de Talero, naval superintendent in this country for the Spanish Royal Government, under whose supervision the vessel has been built. There were also present at the launch Signor Juan Cervera, representing his father, his Excellency General Cervera, chief of the Spanish Legation in London; Captain R. de Talero, Captain de Avila (who will go as commander of the vessel) and Captain Vasquez (his second in command), Mr. and Mrs. Haynes and Miss Haynes, of Cadiz; Signor Ernesto Scanavino, Mr. Donald, Mr. R. Morton, Glasgow, and others.

**Vulcan.**—On May 8th Messrs. J. & J. Hay launched from their yard at Kirkintilloch a screw steamer for the coasting trade. The vessel, which will carry about 100 tons, was named the *Vulcan* by Miss Bathia Richmond, Kirkintilloch.

**Queen o' the May.**—On May 8th Messrs. A. & J. Inglis launched a steam yacht of 300 tons for Mr. W. A. Coats, which has been named the *Queen o' the May*. She is from Mr. G. L. Watson's design.

**Lady Sophia.**—On May 9th Messrs. Ramage & Ferguson, Limited, launched from their shipbuilding yard at Leith, a steel steam yacht of 280 tons, Y.M., built to the order of Mr. Robertson, of Washington Hall, near Peterborough. Built to the designs of Mr. St. Clare J. Byrne, Liverpool, the new vessel presents a very handsome and bold appearance, being modelled as a good sea boat, as well as to have great speed. Her principal dimensions are:—Length, 149 ft.; breadth, 21 ft.; depth, moulded, 12 ft.; while the machinery consists of a set of triple-expansion engines, having cylinders 13 in., 21 in., and 34 in. diameter, by 22 in. stroke, supplied with steam from a steel boiler working at 165 lbs. pressure. Electric light is fitted throughout and all other recent improvements, including bronze propeller, steam windlass, ash ejector, &c. The cabins below are unusually large and well fitted, and on deck a spacious deckhouse affords ample accommodation for a large party. On leaving the ways the yacht was named the *Lady Sophia* by Mrs. Byrne, of Hoylake.

**Girasol.**—On May 9th Messrs. Scott & Sons launched from their shipbuilding yard at Bowling, a screw steamer of dimensions 180 ft. by 29 ft. by 13 ft., built to the order of Mr. William Robertson, 15, Gordon Street, Glasgow. Triple-expansion engines will be fitted on board by Messrs. Muir & Houston, Kinning Park, Glasgow. On moving down the ways the steamer was named *Girasol* by Miss Jane B. Cassels, Buchanan Gardens, Mount Vernon.

**Dandie Dinmont.**—On May 10th Messrs. A. & J. Inglis launched from their building yard at Pointhouse a beautifully modelled paddle steamer for the North British Steam Packet Co. for their service from Craigendoran. This vessel was gracefully named the *Dandie Dinmont* by Miss Macpherson, daughter of Bailie H. S. Macpherson, Park Gate, and was immediately placed under the builders' crane to receive her machinery. She was built to the specification of Mr. Robert Darling, the company's manager, and under his superintendence, and will be a useful addition to the fleet so successfully managed by him. The new *Dandie Dinmont* is of similar dimensions to the old Clyde favourite of the same name, built by the same firm 30 years ago for the same owner.

**Nicolai II.**—On May 10th Messrs. Lobnitz & Co., Renfrew, launched the first of three steamers they are building for the United Steamship Co. of Copenhagen. The vessel will take a cargo of 3,500 tons, and is also arranged for a few passengers. The engines are triple-expansion, and are made by the builders. On leaving the ways the steamer was gracefully named *Nicolai II.* by Miss Caspersen, daughter of Mr. L. C. Caspersen, superintending engineer, who was present on behalf of the United Steamship Co.

**Mermeriss.**—On May 10th Messrs. John Fullerton & Co. launched at Paisley the last of three steamers of about 200 tons each, which they have constructed to the order of Messrs. Thomson & Campbell, London, for foreign service as revenue cruisers, and for which they are specially designed. Engines on the compound principle, and of great power, are to be fitted by Messrs. Ross & Duncan, Whitefield Works, Govan. The steamer was named *Mermeriss* by Mrs. Kyle, wife of Captain Kyle, who has inspected the steamers while building.

**Lady Windsor.**—On May 10th Messrs. Croom & Arthur launched from their yard, Victoria Dock, Leith, a powerful screw tug, 95 ft. by 18 ft. 6 in. by 10 ft. 6 in., moulded, with engines of 400 I.H.P., to the order of Messrs. W.H. Tucker & Co., Cardiff. She was named *Lady Windsor* by Miss Croom, 25, Charlotte Square, Edinburgh.

**Athene.**—On May 10th Messrs. Charles Connell & Co., Scots-town shipyard, launched the steam yacht *Athene*, a duplicate of the *Moneira*, launched by them a fortnight ago. She is built to the order of Mr. Charles Connell.

**Zephyr.**—On May 10th Messrs. Hanna, Donald & Wilson launched from their Abercorn shipbuilding yard, at Paisley, the second of the two torpedo-boat destroyers they are building for Her Majesty's Government. A number of officials from the Admiralty were present, and when everything was ready Mrs. Ford out the line and launched the vessel, which, while leaving the ways, was gracefully named *Zephyr* by Miss Barry. The vessel is 200 ft. long by 19 ft. beam, having a displacement of about 280 tons. She is fitted with two sets of triple-expansion surface condensing engines having a collective H.P. of about 4,000 indicated. The boilers are of the usual locomotive type. They are fitted in two separate watertight compartments, with the necessary fans for supplying air under forced draught. Her armament will consist of one 12-pounder quick-firing gun on conning tower, four 6-in. quick-firing guns on the broadside, one 6-in. quick-firing gun on pedestal aft. There are also two single revolving torpedo tubes on deck, and she is to have powerful electric searchlight. The officers and engineers' cabins are arranged abaft the engine-room. The crew's accommodation is arranged forward.

**Fujiyama.**—On May 13th Messrs. John Reid & Co., Limited, launched from their yard at Whiteinch a screw steam yacht for Mr. Andrew Coats, Ferguslie House, Paisley, which received the name *Fujiyama* from Miss Coats, of Ferguslie House, Paisley. This vessel, which was designed by the builders, and has been built to Lloyd's highest class, is of 170 tons yacht measurement, and has triple-expansion engines fitted by Messrs. Hall-Brown, Buttery & Co., Govan.

**Malta.**—On May 14th Messrs. Caird & Co., Greenock, launched the screw steamer *Malta* for the P. & O. Co., similar in most respects to the ships *Simla* and *Nubia*, built by the same firm. Dimensions:—Length, 430 ft.; breadth, 50 ft.; depth, 33 ft.; gross tonnage, 5,800; deadweight carrying capacity, 7,000 tons. The builders will supply triple-expansion engines of 8,600 I.H.P. The *Malta*, which is for the Indian and Australian trade, has accommodation for 90 first-class and 62 second-class passengers. She is also fitted with

all the latest appliances of a cargo steamer, and is lighted throughout by electricity.

**Prosper.**—On May 15th, the Campbeltown Shipbuilding Co. launched from their yard at Campbeltown, Clyde, a handsomely modelled steel screw steamer, of the part awning deck type. The vessel registers about 1,300 tons gross, and has been especially built to carry a large deadweight on a small draught. All the most improved appliances for navigating the ship and for the speedy loading and discharging of cargo are to be supplied, including steam steering gear, patent stockless anchors, and Clarke, Chapman & Co.'s steam winches. The vessel is fitted with cellular double bottom for water ballast, and has a raised quarterdeck extending to the engine-room, the 'tween deck space in fore hold being utilised for cargo. The accommodation for captain, officers, and engineers, is situated under awning deck before engine-room and is surmounted by a deckhouse, containing the cabin entrance and a spacious chart-room. Awnings are being supplied throughout the ship. The whole arrangements are of the most complete description, special attention having been paid to lighting and ventilation. The crew and firemen are as usual to be berthed forward under the awning deck, and a whaleback and large deckhouse have been fitted aft for store-rooms, protection of steering gear, and additional accommodation for officers and passengers. The engines, which are being supplied by Messrs. Kincaid & Co., Clyde Foundry, Greenock, are of the triple-expansion type, and have 17½ in. high-pressure cylinders by 39 in. stroke, steam being supplied at a working pressure of 160 lbs. There is also a large donkey boiler capable of supplying ample steam to the steam winches. A speed of 11 knots on a small consumption has been guaranteed by the builders. The vessel, which has been built to class 100 A1 at Lloyd's and has also been accepted by the Norwegian Veritas for classification to their highest class, is intended by the owners, Messrs. Larssen & Kjaer, of Drammen, for the China coasting trade, and has been specially fitted to carry native passengers. As the vessel left the ways, she was gracefully named *Prosper* by Mrs. Goddard, Solheim, Bargate, Grimsby.

**Cala Mara.**—On May 16th there was launched from the yard of Messrs. John Reid & Co., Limited, Whiteinch, a steel screw steam yacht of about 230 tons yacht measurement, for Mr. Neil Mathieson, of Beechfield, Liverpool. This vessel, which has been designed by the builders, is to Lloyd's highest class, and is the fourth yacht built by Messrs. Reid for the same owner. The machinery consists of triple-expansion engines, fitted by Messrs. David Rowan & Son, Elliot Street, Glasgow. As the vessel left the ways she was named *Cala-Mara* by Mrs. Robert Morris, of Carlton, Little Sutton, Cheshire.

**Greyhound.**—On May 16th the steel paddle steamer *Greyhound* was launched by Messrs. James & George Thomson, Limited, at Clydebank. She has been built for the North Pier Steamship Co., of Blackpool, and is specially intended for the excursion traffic between that port and the Isle of Man. The vessel has a length of 230 ft., breadth of 27 ft., and a depth of 10 ft.

**Balgay.**—On May 22nd the Dundee Shipbuilders' Co., Limited, launched from their shipyard a steamer for Messrs. William Kinnear & Co., Dundee. The vessel, which was christened the *Balgay* by Miss Jane Rae, Baludderon, Tealing, on leaving the stocks, was towed to Victoria Dock, where her engines and boilers will be fitted up by Messrs. J. & H. Whyte & Cooper. The *Balgay* will have a carrying capacity of about 300 tons, and it was expected she would be ready for sea in about ten days. At the conclusion of the ceremony a number of ladies and gentlemen were entertained at a cake and wine banquet in the office of the Shipbuilders' Co. Captain Lindberg, managing director of the Dundee Shipbuilders' Co., presided, and amongst those present were Mr. William Kinnear, Mr. A. H. Stephen, Mr. James M'Laggan, Mr. George Drummond, Mr. James Galloway, Errol; Captain Rollo, Mr. G. E. Kidd, secretary; Mr. David Burns, manager; Mr. George M'Ritchie, Mr. J. E. Crow, Mr. G. M. Kidd, Mr. Joseph Thomson, Lloyd's surveyor; and Mr. F. S. Stephen. The chairman stated that this was the first ship built and launched by the young company in that yard, and he hoped they would receive plenty of good and substantial orders. He congratulated Messrs. William Kinnear & Co., the managing owners of the *Balgay*, on the fact that they had received a splendid job, not only in material, but in workmanship. Mr. William Kinnear,

on behalf of the co-owners, thanked Captain Lindberg for the kind way in which he had referred to the *Balgay*, and for his good wishes for the success of the vessel. He congratulated him, as chairman of the young company, on the very successful launch which they had witnessed. He and his co-owners had every reason to be satisfied with the workmanship and material which they had got in the *Balgay*.

**Konningen Wilhelmina.**—On May 23rd there was launched from the yard of the Fairfield Shipbuilding and Engineering Co., Limited, Govan, a large steel paddle steamer, named the *Konningen Wilhelmina*, which has been built to the order of the Zealand Steamship Co., Flushing, for mail and passenger traffic between that town and Queenborough. This is the first of three similar vessels which the Fairfield Co. have contracted to build for the same owners. Her dimensions are:—Length between perpendiculars, 320 ft.; breadth, moulded, 35 ft. 6 in.; depth, moulded to upper deck, 24 ft. The vessel is built of steel throughout, to the requirements of Lloyd's rules for the A1 class for Channel service, and has been under special survey during construction. The hull is closely sub-divided by steel watertight bulkheads in order to ensure as far as practicable the vessel's safety in case of collision. She has a straight stem and elliptical stern, and is flush decked, with a large deckhouse aft, a bridge between the paddle-boxes intended for passengers' use, and navigating and look-out bridges. Accommodation is provided for passengers on all three decks, the first-class being arranged in the after part of the vessel and the second-class forward. The first-class passengers have a spacious entrance in the middle of the after deckhouse. A very large state-room, specially fitted for persons of high rank; and four deck cabins also communicate with this entrance, while the remainder of the house contains the smoking-room, the well for light and ventilation to the dining saloon and two deck cabins. A large staircase leads from the upper deck entrance to the main deck, on which are situated the dining saloon and ladies' cabin. The dining saloon is framed in mahogany and satinwood, with picture panels specially painted for the ship by Dutch artists; and the ladies' cabin has lincrusta-walton panels with framing painted in delicate tints. From the end of the dining saloon a corridor extends aft, with passages on either side leading to the sleeping cabins, the greater part of which are situated here and immediately below on the lower deck. The forward deck-house contains an entrance leading to the second-class accommodation. This consists of a dining saloon and ladies' cabin on the main deck and an apartment on the lower deck, all being fitted up with berths or sofa-beds. The total number of passengers in the first-class will be about 180, and in the second-class 72. Ample lavatory, &c., accommodation is provided for each class, all the most recent improvements in sanitary fittings being embodied. The galley is built at the after end of engine casing, pantries being fitted in convenient positions for the service of the dining saloons. A large post office is built on the starboard side forward, and an adjacent apartment is reserved for the mail officer. The first and second officers' cabins are on the upper deck under the bridge, and the engineers are berthed on the main deck immediately forward of the machinery space; while a comfortable mess-room is provided on the port side forward. The seamen and petty officers are berthed in fore-castle on the main deck, and the firemen on lower deck at the extreme fore-end. All the accommodation is fitted with apparatus for heating by steam, and the ventilation throughout has been made very complete, by natural means in the upper cabins, and by the foul air being extracted by means of fans from the lower cabins. Six boats and a full outfit of life-saving appliances equal to British Board of Trade rules will be supplied to the vessels on completion. Hold space is arranged for a large quantity of cargo, and steam winches are fitted for the loading and discharge of same. Steam fire-extinguishing pipes are fitted to each hold. The vessels will be steered by a steam steering-engine placed amidships, and a hand screw-steering gear is also provided aft in case of emergency. A steam capstan windlass is fitted forward, and a steam warping capstan aft on the upper deck. The vessels will be fitted with triple-expansion diagonal surface-condensing engines. The cylinders, three in number, are placed side by side, and work a three-throw crank shaft. They are the most powerful triple-expansion engines fitted to any paddle-steamer afloat. The Zealand Co. in adopting the three-crank triple-expansion engine for these new vessels had in view the maintaining of the reputation already enjoyed by them and the comfort of the travelling public by doing everything possible to ensure the

smooth and regular motion of the vessel at a high speed, besides obtaining the economy in fuel due to this type of machinery. The crank and paddle shafts are of mild steel made by Sir Joseph Whitworth & Co., Limited, the crank shafts being connected to the paddle shafts by flanged couplings and bolts. The high-pressure cylinder is fitted with a piston valve, and the medium-pressure and low-pressure cylinders are each fitted with a flat slide valve, all worked by the usual double eccentrics and link-motion valve gear. The starting and reverse gear of the main engines is effected by a steam and hydraulic reversing engine. The condenser is cylindrical, constructed of boiler plates, and placed between the cylinders and the supports for the crank shaft, the necessary condensing water being supplied by a large centrifugal circulating pump, worked by two independent steam engines. In the engine-room is fitted a feed heater, an evaporator, and a feed filter, and all other modern appliances to ensure economy and efficient working of the machinery. The paddle-wheels are constructed of forged Siemens-Martin steel, on the feathering principle, and fitted with curved floats. Steam is supplied by six large single-ended boilers of the ordinary multitubular marine type, and adapted to work with forced draught. They are arranged in two separate boiler-rooms, and there will be two funnels. Each boiler has four corrugated furnaces, making a total of twenty-four furnaces. They are constructed entirely of steel, and for a working pressure of 170 lbs. Fans and engines are fitted to supply air to the stokeholds to work with forced draught. Among those present at the launch were—Mr. Van Woerden, managing director of the Zealand Steamship Co.; Sir Wm. Arrol, Mr. Barnwell, Dr. Elgar, Mr. Shearer, Mr. Laing, Mr. King, and Mr. Harding, of the Admiralty; Mr. J. Lester Clark, Mr. Wm. Beardmore, Mr. Teding van Berkhout, Mr. A. R. Mees, consulting agent for the Netherlands, and Mrs. Mees, Mr. W. Boyd Anderson, Mr. Thomas Menzies, Mrs. Shearer, Mr. William Brown, of London, and others. Mrs. Mees performed the christening ceremony. After the launch the party adjourned to the luncheon-room. Mr. Barnwell proposed the toast of "The Queen," and also that of the young "Queen of Holland," after whom the new vessel is named. Mr. Barnwell then proposed "Success to the new ship." Mr. Van Woerden replied, and proposed "Success to the Fairfield Co." Sir William Arrol replied. Dr. Elgar proposed "Mrs. Mees," to which Mr. Mees replied.

**Glenfinnart.**—On May 23rd Messrs. A. Rodger & Co., Port-Glasgow, launched a full-rigged three-masted sailing ship of 1,800 tons register, to carry 3,300 tons deadweight. Her principal dimensions are:—Length, 265 ft.; breadth, 40 ft.; depth, 23 ft. 6 in. This vessel has been built to the order of the Glen Shipping Co., Glasgow, and was named *Glenfinnart* by Mrs. Leschalles, Ardentinny. The vessel has been chartered to load at Swansea for San Francisco.

**Tel-el-Mina.**—On May 23rd Messrs. Fleming & Ferguson, shipbuilders and engineers, Paisley, launched from their yard the *Tel-el-Mina*, a powerful twin-screw tug steamer, built to the order of the Egyptian Government, for service at Alexandria. She will be fitted by the builders with two sets triple-expansion surface-condensing engines to indicate 600 H.P. The vessel has been built under the direction of Lieutenant-Colonel J. H. Western, London.

**Carinthia.**—On May 24th there was launched from the yard of the London and Glasgow Shipbuilding Co., Limited, Govan, the *Carinthia*, a new twin-screw steamer, sister ship to the *Sylvania*, lately launched from the same yard, both for the Cunard Co. The dimensions of the *Carinthia* are:—Length, 460 ft.; breadth, 42 ft. 6 in.; and depth, 49 ft.; and she carries 6,500 tons deadweight. The vessel being twin-screw, the framing on the after-end is carried out to meet the stern tubes, and ends in a massive steel casting on each side built into the hull of the vessel. There are nine watertight doors on each side in the 'tween decks only, to expedite the working of cattle and cargo. Although built to Lloyd's highest class, the vessel has special extra strengthening at the bilge and topsides, and is fitted to pass the American survey. She is lighted with electricity throughout. The cattle fittings are on the plan of Mr. Wm. Wylie's patent slingable fittings, whereby the whole space can be cleared and utilised for cargo. The propellers have bronze blades, and the shafting is of Vicker's steel. The christening ceremony was performed by Mrs. James Clelland Burns. After the launch a large company was entertained by the builders, and the usual toasts were proposed and replied to.

#### LAUNCH—IRISH.

**Statesman.**—On Saturday morning, May 25th, Messrs. Workman, Clark & Co., Limited, launched from their shipbuilding yard a large steel screw steamer named the *Statesman*. This vessel has been built to the order of Messrs. T. & J. Harrison, of Liverpool, and is the fourth vessel built for them by Messrs. Workman, Clark & Co. She is of the following dimensions:—Length, 450 ft.; breadth, 52 ft. 6 in.; depth, moulded, 33 ft. 9 in.; with a large deadweight carrying capacity. The vessel is subdivided by nine watertight bulkheads into seven holds, each fully equipped with winch and four derricks to each hatch, providing for a rapid loading and discharging of the vessel's cargo. A cellular double bottom is fitted fore and aft for water ballast, and the peaks are fitted for ballast also. The erections on the upper deck consist of a poop with accommodation for the crew, a long bridge and a topgallant forecabin with rooms for petty officers, &c. On the bridge deck, contained in a deck-house is the saloon, captain's room, &c. The officers and engineers' rooms are placed alongside the engine casing. The machinery has also been constructed at the builders' engine works, and consists of triple-expansion engines with two large boilers.

#### LAUNCH—DANISH.

**Finland.**—A new cargo steamer was launched from the yard of the Flensburg Shipbuilding Co. on the 10th April. She is built for the Steamship Co. "Nordsees,"—director, Mr. Alfred Christesen,—in Copenhagen, and has dimensions: 250 ft. by 34 ft. 2 in. by 17 ft. 6 in. Triple-expansion engines, 500 H.P., also to be built by the Flensburg Shipbuilding Co. As the vessel started on the way she was christened by Mrs. Andersen with the name *Finland*.

#### TRIAL TRIPS.

**Speedy.**—The steam yacht *Speedy*, 140 tons Y.M., just completed for Baron de Barreto, of Brandon Park, Suffolk, by Ramage & Ferguson, Limited, from the designs of Mr. Dixon Kemp, London, has now finished her natural draught trials with most satisfactory results. The first test of speed was on a continuous run of five hours, when it was found to be 12½ knots, the engines during this period working smoothly and without a hitch. The vessel was then tried on the measured mile at Aberlady, when a mean speed of 13 knots was obtained, with the engines indicating 400 H.P. The principal particulars of this yacht are:—Length, 106 ft. by 16 ft., beam by 11 ft. 5 in. depth; the machinery consists of a set of triple-expansion engines, made by the builders, with cylinders 12 in., 19 in., and 30 in. diameter by 21 in., steam being supplied from a large boiler working up to 180 lbs. pressure. The *Speedy* is the fastest and most completely equipped yacht of her size afloat, having steam windlass, electric light, forced draught, distilling apparatus, and all the most modern improvements, including a launch with a Daimler motor. The electric installation is driven by Messrs. C. A. Parsons & Co.'s steam turbo, and the forced draught fan has been supplied by the same makers.

**Gubrun.**—On April 3rd, the new cargo-steamer, built for the Steamship Co., 1889, by the Flensburg Shipbuilding Co., was taken on trial-trip in the Flensburg Harbour. The steamer is built of steel to Bureau Veritas' highest class, and has the following dimensions:—243 ft. by 34 ft. 2 in., by 17 ft. 2 in. Her engines are built by the Flensburg Shipbuilding Co., on the triple-expansion principle with 500 I.H.P. The measured distance was run at a speed of 9 knots.

**Haken.**—On April 5th a new fine passenger steamer, built by the Flensburg Shipbuilding Co., for the Neue Dampfer Compagnie, of Stettin, went on trial. This steamer is built for the trade between Stettin and St. Petersburg, and has a very comfortable arrangement for 40 first-class passengers. The saloon is finished in a very tasteful style in hardwood. All berths for passengers are fitted most comfortably. The dimensions of this steamer are:—230 ft. by 32 ft. by 18 ft. 6 in., and highest class in Bureau Veritas and German Lloyd's. The triple-expansion engines, built by the Flensburg Shipbuilding Co., gave the ship a speed of 10½ knots. Everything worked to the greatest satisfaction of the owner.

**Verbena.**—On Saturday, April 20th, the fine steel screw steamer *Verbena*, the latest addition to the fleet managed and owned by Messrs. J. Lilly & Co., West Hartlepool, went on her trial trip. There was a large company of gentlemen on board, some of whom are financially interested in the vessel. The weather was beautifully fine. A start was made from the Coal Dock shortly after noon, and once clear of the harbour an easterly course was steered. After luncheon the compasses were adjusted, and the log heaved overboard. The *Verbena* then steamed out to sea for three-quarters of an hour, turned, and steamed for three-quarters of an hour towards the land. It was found that she had travelled at the rate of 11.6 knots an hour, a result that was deemed highly satisfactory by the many experts on board, more especially when the cross currents that prevailed were taken into consideration.

**The Spaniel.**—On April 26th the *Spaniel*, the latest addition to Messrs. Burns' fleet of coasting passenger steamers, just completed by the well-known firm of Messrs. A. & J. Inglis, of Pointhouse, and built specially for Messrs. Burns' trades between Glasgow and Liverpool and Manchester, went her official trial between the Cloch and Cumbrae Lighthouses with results satisfactory alike to the builders and owners. A speed of 14 knots was maintained on six continuous runs between the lights, and when it is stated that the guaranteed speed on this trial was 13 knots, it will be seen Messrs. Inglis are to be congratulated on the result achieved. The *Spaniel's* dimensions are—260 ft. long, 33 ft. 6 in. broad, and 17 ft. 2 in. deep. She has triple-expansion engines, and will carry a very large cargo, and every facility is provided for the quick loading and discharging of traffic by day or night, a complete installation of electric light being fitted throughout the whole ship. The poop is entirely given up to sleeping accommodation for cabin passengers, and is most spacious, and on the poop there is a commodious deckhouse, in which is a most attractive dining-saloon with a table down the centre, and on each side small tables arranged in the same style as in the railway corridor dining-saloons. On the bridge deck there is a large smoking-room, fitted in a most complete and comfortable manner. An ample steerage is fitted forward. Everything about the *Spaniel* is finished in a manner which has shown much forethought for the comfort of passengers and for the expeditious working of cargo.

**Aaypion.**—On April 27th the new steamer *Aaypion* went down the Forth from the yard of Messrs. Cumming & Ellis, Inverkeithing, on her trial trip. The vessel, which is 136 ft. by 23 ft. by 11 ft. 4 in., was built to the order of Greek owners, and is intended for trading on the Grecian coast. She is designed to carry 25 first-class and 15 second-class passengers. On the mile a speed of 11½ knots was attained.

**Arkadia.**—On Tuesday, April 30th, the s.s. *Arkadia*, built by Messrs. Craig, Taylor & Co., of Thornaby-on-Tees, to the order of Messrs. A. C. de Freitas & Co., of Hamburg, proceeded to sea for her trial trip, which proved highly satisfactory in every respect. The dimensions of the vessel are:—288 ft. by 41 ft. by 24 ft. 7½ in. depth moulded to awning deck, and constructed to carry about 2,500 tons on 16 ft., also a large number of passengers. The engines, which have been fitted by Messrs. Blair & Co., Limited, are 21 in., 35 in., 57 in. by 39 in. stroke, with two boilers 160 lbs. pressure, and they gave a speed of 11½ knots. The owners were represented by Mr. Carlos de Freitas, son of the owner, and Mr. H. Wiengreen, the owners' superintendent. This is the fourth vessel owned by Messrs. de Freitas & Co. which Messrs. Craig, Taylor & Co., have built. Immediately after the trial the vessel proceeded to Hamburg, from which port she had to sail with the mails to the Brazils on the 5th of May.

**Romsdalen.**—On May 1st the s.s. *Romsdalen*, which is a fine steel screw steamer built by Messrs. Wm. Gray & Co., Limited, to the order of Messrs. Erichsen, Harland & Willis, of West Hartlepool, went on her trial trip in Hartlepool Bay. The vessel takes Lloyd's highest class, and her dimensions are:—Length over all, 310 ft.; breadth, 40 ft.; and depth, 20 ft. 10 in. She is of the partial awning deck type, with poop and raised quarter-deck. The saloon and cabins are tastefully fitted in the poop, the engineers' rooms amidships, and the crew's accommodation forward. The hull is built with web frames, and a cellular double bottom for water ballast, and the after peak is also constructed as a ballast tank. The steam winches, steam steering gear amidships, screw gear aft, two donkey boilers, patent direct steam windlass,

stockless anchors stowing into hawse pipes, &c., are all of the best description, and shifting boards, as required by the Grain Carrying Acts, are fitted. Boats on beams overhead, two masts, telescoping to clear bridges, with schooner rig and all modern appliances, have been fitted to thoroughly equip the vessel for general trading. The Central Marine Engine Works of Messrs. Wm. Gray & Co. have supplied the engines, which are of their well-known triple-expansion type, having cylinders 22 in., 35 in., and 59 in. diameter, with a 39 in. piston stroke. The boilers are of large size, built of steel, working at 160 lbs. pressure per square inch. The engine-room department is also fitted with Mudd's evaporator and all the latest improvements. The compasses having been adjusted by Mr. Berry, the engines were fully opened out, and a lengthy run made, when it was found that the average speed of the vessel was 10½ knots. Everything worked well, and to the entire satisfaction of all parties concerned. Mr. G. B. Harland, Mr. Hans Erichsen, and Captain Willis were on board, together with a large party of friends. On the conclusion of the trial the vessel proceeded to the Tyne to load for the Mediterranean.

**Colonel J. T. North.**—On May 1st the new steamer *Colonel J. T. North*, which has been built by Messrs. Short Bros., at Sunderland, to the order of the Nitrate Producers' Steamship Co., Limited, of which Messrs. Lawther, Latia & Co., of London, are the managers, went on her loaded trial. After adjusting the compasses the vessel was run over the measured mile with satisfactory results, seeing the vessel had a deadweight cargo of over 4,500 tons on board. A mean speed of 9½ knots was obtained over a series of runs. The engines, which worked smoothly, were supplied by Messrs. W. Allan & Co., of Sunderland, the cylinders 23 in., 38 in., and 62 in. diameter, with a stroke of 42 in.

**Keong Wai.**—On May 2nd the s.s. *Keong Wai*, built by the Fairfield Shipbuilding and Engineering Co., Limited, for the Scottish Oriental Steamship Co., Limited, went on a trial trip. This is the eleventh vessel built at Fairfield for the Scottish Oriental Co., and is classed in the highest grades in the Bureau Veritas, also in the British Corporation, and is under the Board of Trade survey. The dimensions of the *Keong Wai* are 290 ft. by 38 ft. by 22 ft. 9 in., and she is fitted out with all the latest improvements for working cargo in the special trade for which she is intended. There is also accommodation for a limited number of first-class passengers. On the measured mile at Skelmorlie a speed in excess of the contract was obtained, and the trial was in every way satisfactory. The steamer left in the evening for Cardiff to load for China.

**Thetis.**—On May 3rd the screw-steamer *Thetis*, which has been built by Messrs. Scott & Sons, Bowling, for Messrs. Robert Walker & Co., Glasgow, went on a trial in the Firth of Clyde. The vessel is intended for the fish-carrying trade, is 140 ft. long, 24 ft. broad, 11 ft. 2 in. deep, and has triple-expansion engines by Messrs. Ross & Duncan, Govan. The boilers are of what is called the water and fire tube type, and have been constructed by Messrs. Anderson & Lyall, Govan. Mr. Lyall, who is the patentee, believes that in the boiler are combined the best features of both the ordinary return tube and the water tube. Furnace flues are not used, but the furnace is enclosed by a number of water tubes, having many times the heating surface of ordinary furnace crowns. The cylindrical shell enclosing the fire tubes is very much less in diameter than in other types suitable for merchant vessels, and the boiler is consequently lighter and occupies less space. There is almost perfect circulation, as all the water passes continuously over and around the fire, and the temperature throughout is practically the same. The boiler is self-contained—the heat being within the furnace and the cylindrical shell—and is surrounded by water, which takes up the radiant heat as in the ordinary marine type, requiring no outside casing to keep in the heat radiated from the hot gases as in the water-tube type. All the tubes are straight, and may be got at from both ends, and the replacing of one or other may be done from the stokehole. The inventor claims that the boiler is about one-half the weight of an ordinary marine boiler, carries sufficient yet less weight of water, and has a much larger heating surface directly over the fire. There are no firebrick sides in the furnace for clinker to adhere to, and combustion is complete. A marine boiler of the type is at work in Messrs. Anderson & Lyall's boiler-shop, Whitefield Road, where for two years it has been used constantly in the generation of steam to drive



the machinery. The machinery worked satisfactorily, and on the measured mile a speed of nearly 12 knots was attained.

**Lombard.**—On Saturday, May 4th, the s.s. *Lombard*, recently launched by Messrs. the Blyth Shipbuilding Co., Limited, of Blyth, for the Lombard Steamship Co., Limited, of London (Mr. John White, manager), was taken to sea for her official trial trip. The vessel was run over the measured mile several times, and the speed obtained was highly satisfactory to both the builders' and owners' representatives who were on board, the engines working with perfect smoothness throughout. The *Lombard* is designed to carry a very large and bulky cargo, and is fitted up in every way with up-to-date appliances for working both the ship and cargo. After completing the necessary trials of speed, the vessel proceeded to Cardiff to load for Buenos Ayres in charge of Captain Raison. The *Lombard* has been built under the supervision of Mr. George Walker, consulting engineer, of London, who has also superintended the construction of the engines and boilers which have been supplied by Messrs. Blair & Co., Stockton-on-Tees, and are of the triple-expansion type of large power.

**Trevethoe.**—On May 6th the new screw steamer *Trevethoe*, built to the order of Messrs. Edward Hain & Son, St. Ives, by Messrs. John Readhead & Sons, South Shields, was taken on her trial trip off the Tyne. The vessel is of the following dimensions:—Length, 284 ft.; breadth, 39 ft.; depth moulded, 19½ ft. ½ in. The engines, also built by Messrs. John Readhead & Sons, are of the triple-expansion type, having cylinders of 20½ in., 33½ in., and 55 in. diameter, and 36 in. stroke, steam being supplied from two large steel boilers working at a pressure of 160 lbs. per square inch. The vessel, which is intended for general trades, is of the partial awning deck type, and is fitted with all the latest improvements and appliances for loading and discharging cargo. After compasses had been adjusted the vessel steamed north and south, her speed, &c., being thoroughly tested over the measured mile, 11½ knots being attained. The engines worked admirably, the trial being highly successful and satisfactory to all concerned, and quite up to the anticipations of both owners and builders. After the trial the vessel proceeded to Tyne Dock to load a cargo of coals for Constantinople.

**Helge.**—On May 7th the trial trip of the s.s. *Helge*, built by the Elsinore Iron Shipbuilding and Engineering Co., Elsinore, Denmark, to the order of the Steam Navigation Co. Denmark, of Copenhagen, took place in the Sound, and was considered very satisfactory. Her dimensions are 270 ft. by 37 ft. 11½ in. by 17 ft. 10½ in. depth of hold. The engines are of the triple-expansion type, and during the trial trip the engines indicated 1,000 H.P., the result being a mean speed of 11½ knots.

**Zara.**—On May 11th the new steam yacht *Zara*, 500 tons measurement, went her trials on the Clyde, and attained a speed of 12½ knots per hour with a limited pressure of steam. The *Zara* belongs to Mr. Peter Coats, of Paisley; was designed by Mr. G. L. Watson; built by the Ailsa Shipbuilding Co., Troon; and engined by Messrs. David Rowan & Son, Glasgow.

**Turret Crown.**—On May 11th this turret deck steamer was taken on her official trial, when a mean speed of 11½ knots was registered, her total deadweight capacity being 3,200 tons on 18 ft. 3½ in. draught. She has been built by Messrs. William Doxford & Sons, Limited, of Sunderland, to the order of the Turret Steam Shipping Co., Limited, Newcastle, and has received the highest class in both the British Corporation and Bureau Veritas Registries.

**Wallowra.**—On May 14th the steamer *Wallowra* made her trial trip after undergoing extensive alterations at the hands of Messrs. Gourlay, of Dundee. The vessel is owned by the Adelaide Steamship Co., of Australia, and was purchased by them, along with the *Marloo*, from the Italiano-Britannico Steamship Co. Both vessels were built at Jarrow-on-Tyne four years ago, and had been engaged in the cargo trade between the Mediterranean and London. Several months ago they were placed in the hands of Messrs. Gourlay to be fitted out as first-class passenger boats, their cargo carrying capacity to be at the same time preserved as much as possible. The internal arrangements have been completely reorganised, and accommodation has been provided for 80 first-class, 90 second-class, and 250 steerage passengers. The measurements of the steamers are 320 ft. by 40 ft. by 27 ft. Their engines indicate 3,000 H.P., and their speed about 13 knots.

**Arion.**—On May 14th the large steel screw steamer, *Arion*, built to the order of Messrs. Rickinson, Son & Co., West Hartlepool, by Messrs. Furness, Withy & Co., Limited, Middleton Shipyard, Hartlepool, proceeded on her trial trip in Hartlepool Bay. This vessel is a very fine type of cargo boat, and it is anticipated will prove a powerful addition to the already fine fleet belonging to Messrs. Rickinson. She is over 320 feet in length, and has been specially designed for the heavy deadweight cargo trade, the scantlings being in many instances far in excess of Lloyd's requirements. The shell plating is in exceptionally long lengths, which gives greater strength, and dispenses with a large number of butts or breaking points. The topside plating and bottom plating are also very much thicker than required by Lloyd's rules. Every care has been taken with the accommodation to make the officers and crew as comfortable as possible. The saloon is handsomely fitted up and decorated with hand-painted panels in oils done by the decorative staff of ladies employed by the firm. The engines are by the Central Marine Engine Works, Hartlepool, of the triple-expansion type, having cylinders 23 in., 36½ in., 62 in., by 39 in. stroke, with two large boilers arranged for a working pressure of 160 lbs. During the trial trip the engines worked very smoothly, and an average speed of 11 knots was attained. The owners were represented by Messrs. A. G. Rickinson and C. E. Smith, and the builders by Messrs. R. W. Vick and Jackson, Mr. T. Mudd representing the engine builders.

**Menes.**—On May 17th the new steamer *Menes*, built by Messrs. R. Napier & Sons, Limited, Govan, for the Moss Steamship Co., Liverpool, had a most successful trial of her machinery on the Firth of Clyde, when the conditions of the contract were amply fulfilled, and a speed of three-quarters of a knot in excess of the guarantee easily maintained. The *Menes* is a sister ship to the *Ramessa*, recently built by Messrs. Napier for the company's Mediterranean service, and has been specially designed by Messrs. William Esplen & Son for the Egyptian passenger trade between Liverpool and Alexandria, which has been largely developed by the Moss Steamship Co.; and while the new steamer is the outcome of much careful consideration for the comfort of the passengers, the accommodation compares favourably with the somewhat limited space in some mail steamships. The general dimensions are:—Length, 320 ft.; breadth, 38 ft.; depth, 24 ft. 7 in.; and a gross tonnage of about 2,500 tons, with a top-gallant fore-castle, long bridge-house, and full poop. The hull has been built of steel under special survey to the highest class at Lloyd's, and the most modern appliances have been supplied for the efficient working of the ship and the rapid handling of cargo, including a very complete installation of electric lighting throughout the vessel. Very superior accommodation for first-class passengers has been provided on the upper deck amidships, where there is abundance of ventilation and no vibration, and consists of a handsome dining-saloon, finished in selected bird's-eye maple, with a teak dado and satinwood pilasters; a range of extra large sidelights and an open well to the music-room above affords ample light and ventilation. A wide corridor leads to the roomy state-rooms, which are fitted with the most recent improvements for the passengers' comfort. A double stair with teak balustrades and ribbed india-rubber treads leads to a spacious entrance hall on the bridge deck, which is combined with the music-room, and finished in polished hardwood like the saloon. At the forward end is a comfortable ladies' boudoir, with sofas upholstered in peacock blue velvet; and aft are some exceptionally large family state-rooms, and a commodious smoking-room in polished teakwood, with all the requisites for a snug retreat. The machinery consists of a set of triple-expansion engines, with cylinders 22½ in., 38 in., and 64 in. diameter by 48 in. stroke, and two large single-ended boilers for a working pressure of 200 lb., and the most recent improvements for efficiency and economy, including an "Edmiston" feed-water filter supplied by the Glasgow Patents Co., Limited. The results of the trial were very satisfactory, a speed of 13 knots (three-quarters of a knot in excess of the guarantee) having been easily maintained without any trace of priming, the engines working smoothly with an abundance of steam. The construction of the ship and machinery has been superintended by Messrs. William Esplen & Son, Liverpool.

**Duchess of Rothesay.**—On May 17th the trial trip of the *Duchess of Rothesay*, the latest addition to the fleet of the Caledonian Steam Packet Co., took place in the Firth of Clyde. Built by Messrs. James & George Thomson, Limited, Clydebank,



the *Duchess of Rothesay* is a steel paddle steamer of 380 tons, with engines of 1,700 I.H.P., and is intended for the Rothesay service of the company. In appearance and general arrangement the vessel resembles the more recent steamers of the Caledonian Co. She is 225 ft. by 26 ft. by 9 ft., and her draught is 5 ft. 3 in. The first-class saloon is aft, with dining accommodation below, the second-class passengers being provided for forward. A promenade deck extends to the extreme forward end of the vessel, and is supported at the bow by wrought-iron stanchions. An improvement on previous ships of the company has been effected in the erection of light teak deckhouses at the head of each stairway leading from the promenade deck, so as to prevent rain and spray being blown down in stormy weather. The first-class saloon is a very handsome apartment, panelled with mahogany and satinwood and lighted by large square windows, the tops of which are hinged to give thorough ventilation. Forward of the first-class saloon is a large ladies' room, and on the other side of the ship is a room for the captain and another for the purser. The upholstery work was carried out by Messrs. J. G. Rowan & Co., Greenock. The vessel is fitted with the latest improvements, including Caird & Rayner's feed-heater, Alley & Mc'ellan's patent "Sentinel" horizontal steam-steering gear and feed water-filter, warping capstans forward and aft, electric installation throughout, and docking telegraphs. The *Duchess of Rothesay* has, of course, been built under the supervision of the Board of Trade, and has a large equipment of deck seats with copper buoyancy tanks under them, so that they may be utilized as life-rafts in case of emergency. There is also the usual equipment of life-belts, a large proportion of which are stowed in teak boxes on the promenade deck, to be immediately available in case of emergency. The engines are of the two-cylinder compound diagonal pattern, and the boiler, unlike the remainder of the vessels of the fleet, is of the double-ended return tube pattern, worked on the closed-stokehold system. Captain James Williamson, marine superintendent of the Caledonian Co., superintended the construction of the vessel on behalf of the owners. On May 17th the steamer was tried between the lights, and the mean speed was 18 knots, being in excess of what was required by the specification.

**Bishop Rock.**—On Saturday, May 18th, the s.s. *Bishop Rock*, a new steamer built by the Ailsa Shipbuilding Co., for Messrs. Alfred Rowland & Co., of Liverpool, went on her official trials on the measured mile at Skelmorlie, fully laden, and attained a speed of 10½ knots per hour. The engines, which are by Messrs. Muir & Houston, worked perfectly throughout the day's running. Mr. Alfred Rowland was on board, and was highly satisfied with the results. The vessel and machinery have been built under the superintendence of Mr. George Garnett, and she is under the command of Captain Green.

**Tiger.**—On May 20th the new screw steamer *Tiger*, recently completed by Messrs. Ropner & Son, at their shipbuilding yard, Stockton-on-Tees, for Norwegian owners, had her trial trip from the Tees to the Tyne. The steamer is 324 ft. long, built on the spar-decked rule, having poop, bridge, and topgallant forecabin, and takes Lloyd's highest class; she is designed to carry 5,000 tons on 21 ft., and has very large capacity for light cargoes. The saloon and cabins for captain and officers, which are in the poop aft, are tastefully and comfortably fitted, while the engineers are accommodated on the bridge amidships, and the crew and firemen in the forecabin. She has a cellular bottom for water ballast, Emerson-Walker's direct steam windlass, Donkin & Co.'s steam steering gear amidships, with Hastie's screw gear aft, four large steam winches, multitubular donkey-boiler, Byers' stockless anchors, and all necessaries for a first-class cargo steamer. Her engines, which are by Messrs. Blair & Co., Limited, work up to 1,100 effective H.P., with two large steel boilers of 160 lb. pressure; they worked smoothly throughout, giving a speed of 11 knots. The owners were represented by Mr. C. A. Bushall, of Newcastle-on-Tyne, under whose supervision the steamer has been built.

**Cleopatra.**—On May 20th the new steamer *Cleopatra*, built and engined by Messrs. Caird, at Greenock, for the passenger and mail service of the Austrian Lloyd's Steam Navigation Co., went down the Clyde on her trial trip. The *Cleopatra*, which is built of steel and largely in excess of Lloyd's highest requirements for a spar deck ship, is of the following dimensions:—Length, 377 ft.; breadth, 44 ft. 9 in.; and depth, 30 ft. 6 in.; and of 4,100 tons gross register. The engines are of the triple-expansion type, and indicate between 4,000 and 5,000 H.P. To meet the

requirements of the company's traffic, accommodation is provided on board for 80 first, 40 second, and 200 third class passengers. The *Cleopatra* left the Tail of the Bank about 11 o'clock in the forenoon, on a six hours' continuous trial of speed from the Cloch to a distance beyond Ailsa Craig and back. The speed guaranteed by the builders was 14 knots, but the vessel, although loaded with 3,500 tons of cargo, realised during her six hours' trial, and with an easy command of steam, a mean speed of not less than 15½ knots per hour, or fully 1½ knot above the contract.

**Girasol.**—On May 23rd the new screw steamer *Girasol*, recently completed by Messrs. Scott & Sons, Bowling, for Mr. Wm. Robertson's fleet of cargo steamers, went down the Firth on her trial, when she attained a mean speed of 12 knots.

**Buluwayo.**—Last month the large steel screw steamer *Buluwayo*, built at Armstrong's yard on the Tyne, was taken to sea for her trial trip. The *Buluwayo* is the last of three sister vessels ordered by Messrs. Bucknall Brothers for the British and Colonial Steam Navigation Co.'s service to the Cape and the East Coast of South Africa. The chief dimensions of the vessel are:—Length, 376 ft.; breadth, 47 ft.; depth, 30 ft. 6 in.; and she has a deadweight carrying capacity of over 6,000 tons. The vessel is of the three-decked type, and has been built of steel to the highest class at Lloyd's. The *Buluwayo* is fitted with triple-expansion machinery. The cylinders are 30 in., 50 in., and 80 in., by 54 in. stroke, with three single-ended boilers, working at 180 lb. pressure. On the trial the machinery worked in a most satisfactory manner.

## Reviews.

*Kelly's Directory of Merchants, Manufacturers and Shippers*, 1895.

Published by Kelly & Co., Limited, London.

We have before us the ninth edition of this valuable Directory, the first edition having been published in 1877. Evidently the Directory has met the wants of trade generally, as is evidenced by the fact that, although originally published only once in every three years, it has lately been found necessary to produce it annually, and the present is the fourth annual issue. We find the largest portion of this Directory, which comprises nearly 3,000 pages, is composed of alphabetically arranged references to all the chief towns of Europe, India, and the British Colonies, Asia, Africa, and North and South America, with subheadings of all the various trades carried on in such places, and thereunder the names and postal addresses of all firms and individuals engaged in such trades, as merchants, importers and exporters, or local manufacturers. The value of such information to British merchants or manufacturers who seek external markets for their goods or products is incalculable, and we see that British Consuls abroad complain that they are far too often bothered for information as to local merchants or manufacturers which might most easily be obtained from this directory. For the information also of importers or exporters abroad, a very complete directory for London and the British Isles is given under the heading of all various trades, giving names and postal addresses of manufacturers or merchants. Complete condensed indices for all the towns referred to in the volume, and for all the trades specified in such towns, are given at the commencement of the book, so that any enquirer can at once identify the position in the volume of any town as to which he desires trade information, or of any particular trade in which he may be interested. We do not know a more valuable or complete book of reference for those who may be anxious to be informed as to any of the above particulars in any part of the world. For the information of foreigners an alphabetical list of trades in French is given with the English equivalents, so that a foreigner can identify in English the particular trade for which he is looking.

*Petroleum; its Development and Uses.* By R. Nelson Boyd, M.I.C.E. London: Whittaker & Co., 1895.

This is a little book which deals with a very large subject. Though the petroleum industry has developed during the lifetime of middle aged men, it none the less affects us all, both in business and at home. The uses of petroleum are manifold. For lighting, cooking, heating and driving machinery, it is used in its simple state. But its derived products are scarcely less important, found as they are in the chemist's store and on the toilet table, as well as in many manufacturing processes.

Occupation is found for shipbuilders and designers in improving the construction and design of special steamers for its transport, and much ingenuity has been exercised in the various forms of petroleum engine. Mr. Boyd, therefore, appeals to a very wide circle of readers when he deals with petroleum. He traces its history from the earliest historic times down to its introduction as an article of commerce, dwelling of course on the extraordinary rapidity with which demand has increased and been met by supply. The chemistry and geology of the subject have their chapters, and the methods of winning, storing and transporting the product are all dealt with. The chapter on lamp accidents is a very useful one, and it is shown that with properly constructed appliances and proper care in their use the last remains of prejudice against mineral oils for lighting purposes may be altogether removed.

The book is completed by a chapter on petroleum engines, by Mr. A. H. Rowan, but its chief interest lies, we think, in the chapter written by the author himself in favour of the adoption of liquid fuel for steamships and locomotives. That much is to be said is undoubted. But the counter fact remains, viz., that we in this country produce coal and do not produce petroleum. A general adoption of the latter fuel would therefore displace our own goods and make us customers instead of producers. It would also make our warships dependent on external supplies for life and movement in time of war. We are already dependent on outside supplies for too much. This is a difficulty that seems hard to get over. Yet Mr. Boyd's statement of the case for the adoption of petroleum is none the less interesting because we feel the weight of the arguments against new fashions.

*The Naval Annual, 1895.* Edited by T. A. Brassey. Portsmouth: J. Griffin & Co., 1895.

THE ninth edition of the Naval Annual is before us. It is this year divided into four parts. Last year there were five. The concluding part was a review of our Naval Position, by Lord Brassey, which, though interesting, as all that he writes is, was after all but a recapitulation of the matter contained in the first part. The fourth part contains as usual the official papers and estimates relating to our own and the important Foreign Navies. The most striking feature here is a table, showing diagrammatically the expenditure on the construction of new ships during the twenty-four years, 1872 to 1895. The table also which in former years did not appear in the list of contents shows the extraordinary expenditure as distinguished from the ordinary. Perhaps the most striking point about the table is that it emphasises most clearly the hiatus between the close of the Naval Defence Act and the commencement of the Spencer programme. There is no way to be made up on account of that wasted year. Undoubtedly the expenditure on new construction has a steady upward tendency. This may alarm a certain narrow-minded and ignorant section of the community. But if such use the table for their purposes, an answer can easily be made by an extension of the diagram in the 1896 Annual. If Russia and France were treated similarly to ourselves—their movements being shown by coloured lines—we should see that we are barely if actually maintaining our proper relative position. A similarly constructed diagram too might show the navies of the world and their development in relation to the Merchant Shipping they have to protect. Any of these will answer the objection to our increased expenditure, and do so more fully than pages of arguments.

The third part of the volume is, as usual, devoted to armour and ordnance. In the tables of ordnance there have been certain alterations made. It is considered that for the higher muzzle velocities the British formulae give too low a perforation, whilst that of Krupp is more near the truth, and accordingly for velocities above 2,000 feet per second the Krupp system has been adopted. The 12 in. wire gun which is to play so important a part in the defence of this country, forming, as it does, the main armament of the fleet of great battleships now under construction, makes its first appearance in these tables this year. Several new quick-firers are also introduced both into the British and Elswick tables. Amongst the latter we find the latest 8 in. quick-firer, which is longer and heavier than the patterns previously made. Under this division of the book we find at page 356 a most interesting table of the modern rifles either in use or in course of adoption by the Naval Powers. Nineteen countries are included in the table. One of these (the United States) has three weapons, several have a couple, as for instance ourselves,

France, Italy, Holland, Spain and Chili, whilst others have the same pattern in various sizes. The number of patterns does not, however, exceed the number of states, as the Mannlicher is adopted by four Powers, as is the Mauser, and others by more than one.

In the second part we have all the drawings re-drawn by a new process, and undoubtedly the editor is justified in his claim that the change has added greatly to the clearness of the designs. The sketches of the new second-class cruisers of the *Eclipse* type cannot fail to be of general interest. The class contains no less than nine ships now under construction. Comparing this sketch with that of the *Astræa* a few pages earlier, we notice the introduction of fighting tops. To effect this addition it has been necessary to increase the proportion of beam to length, lest the stability of the ships in a sea way might be endangered. The freeboard forward is also somewhat increased, and we find two 6 in. guns placed one on each quarter as stern chasers instead of a single gun on the poop as in the older class. This is a good point, for the deck-protected cruiser will have to trust to her heels in case of meeting with superior force, and it is well that she should be able to sting what time she makes the best of her way from a big opponent. The *Majestic* class is also now included in the list of drawings. We so fully described these ships at the time of the launch of the name-ship that we need not now repeat what was then said. Enough to remark that the increased protection given the *Majestic* over the *Royal Sovereign* is clearly apparent from a comparison of the two drawings. Mr. Laird Clowes again gives his tables of British and Foreign torpedo-boat flotillas brought down to date, and the usual tables of British and Foreign warships are given. In these tables we would call attention to the list given at page 245 of the German merchant auxiliary cruisers. These consist of the four express steamers of the Hamburg Line, all twin screws and of a speed varying from 18 to 19½ knots, and of six single-screw vessels of the North German Lloyd, whose speed ranges from 19 knots downwards. This is a list not much inferior to that which Great Britain herself, the originator of the idea, can show. Though omitted in the Annual, there are other countries who can boast of the adoption of this idea, and we trust that next year the book will contain lists of the auxiliaries of France and the United States. We know that the former country has actually mobilised one of her merchant cruisers to find out the weak spots in the system, and that America has provided armaments for several vessels on both her coasts.

The Brazilian Fleet is not quite up to date in the tables. The warship *Aurora* has been re-named. Though the new name of the *Aquidaban* is given, that of the *Aurora* is not. There seem also from other lists to be certain twin-screw gunboats of comparatively recent build, of whose destruction by the insurgents we never heard, which are not included in the list. We know, however, from personal experience how difficult it is to keep the run of foreign fleets which are always changing names and more or less "jobbing" in their ships—if we may use a Stock Exchange expression in connection with South American Republics. And in this connection we may notice the fact that some of the arrangements of fighting tops given in the designs are not quite correct. But these again are matters which, especially in the French navy, are revised from time to time, as experience shows that vessels have more top hamper than they can safely carry at sea.

The first part is as usual the one to which we wish to devote the bulk of the space at our command, though we should be sorry to imply that one part of the volume is less valuable than another. The first chapter deals with the progress of the British Navy. It gives us a brief review of the new construction of the year, including the trials of vessels completed, and a description of the vessels launched and planned. Most of what is collected here has in some form or another appeared in our Naval Notes. Mention is made of the progress in reconstruction and re-armament. Here there are matters referred to of both a satisfactory and an unsatisfactory character. It is unsatisfactory to be reminded that when a vast sum—no less than £205,000—has been spent on refitting and rearming the *Sultan*, she will still have an obsolete main battery of twelve muzzle loaders. This seems a huge mistake, and attention cannot too often be directed to it. On the other hand, it is satisfactory to learn that such important vessels as the *Blenheim*, *Imperieuse*, *Immortalité* and *Narcissus*, as well as all the second-class cruisers of the Naval Defence Act have had their 6 in. B.L. guns exchanged for quick firers of the same calibre, and that all the 6 in. B.L. guns in the

service, as well as those of less bore, are to be converted into quick firers.

The notes on progress at home are naturally followed by those on progress abroad. Equally naturally the belligerent powers in the East claimed the place of honour. Still it is curious to read here at page 16, "The battle of the Yalu gives us some interesting lessons," and then to look at page 143 where the chapter on the lessons from the war in the East is summed up with the words, "In conclusion, it must be admitted that so far it is impossible to distinguish a single point in the war which has really taught us anything fresh." These two statements seem thoroughly at variance with one another. Yet perhaps they are capable of reconciliation. "Really teaching us anything fresh" is a very wide expression. It would be hard to do that when there is a certain amount of experience as to the performances of ships and men, guns and armour, and especially when, wherever there is doubt on a point, there are schools which take every possible view of what would be the event under the war test. The side which is proved right naturally claims the credit of its perspicacity or good luck, and cries out, "We told you so all along; this teaches us nothing."

But the others have been taught something nevertheless. We have learnt that vessels whose protection is merely a midship belt with unarmoured ends, do not necessarily lose their stability and sink when exposed to an end on fire. We have learnt that quick-firers are indispensable and should be present in great numbers, and that the danger of fire on board has been shown to be of the most real character. These lessons and the vital necessity of great speed in every warship are still needed, for are we not to-day building slow ships and refitting ships with antiquated armaments? Are we taking precautions against carrying too much combustible material? Till these lessons are learnt such engagements as those in the East will still have lessons to teach some of us, and those people who most need them. This chapter in so far as it relates to the Continental Navies may well be read with that which immediately follows it. This deals with relative strengths. Here the position, from the British point of view, is summed up, as regards battleships, with the words, "We may on the whole be satisfied with our present position; our inferiority in second-class battleships is more than compensated for by our superiority in battleships of the first class." As regards the future, some figures are given, and the writer concludes that there "is no immediate ground for apprehension that we shall fall behind our standard of strength in battleships." He however goes on to point out that "the power which aspires to the command of the sea must meet coast defence ships with battleships," and "in coast defence ships we are singularly weak." There is thus a double reason why we must have, if it were possible, an excess of strength in battleships.

The chapter on Naval Manœuvres is again by Mr. Thursfield. He gives the British at considerable length, but does not consider that any foreign fleets did anything last autumn of sufficient consideration to warrant reference. His only note on things foreign is therefore a graceful letter to Lord Brassey, in which he explains the circumstances which led him to be unintentionally unjust to Admiral Vignes, in his remarks on the French manœuvres of the previous year.

Mr. Laird Clowes gives a chapter on the history of the Naval War between China and Japan, and this will be an interesting record for future reference whilst a new feature is added to the volume in the chapter by a great Colonial professor on the International aspects of the sinking of the transport *Kowshing*, a British ship, which, whilst carrying troops for the Chinese, was sunk by the Japs prior to the actual declaration of war. The chapters on naval reinforcements in war time and on the kindred questions of manning are most important. The former shows what capabilities we have for meeting an emergency in *matériel*, the latter discusses the question of *personnel*, a question which is very near Lord Brassey's heart and one which claims the attention of every thinking man concerned with the defence of the country. The position is summed up by the conclusion that we must change our policy. We cannot go on adding the men we want to the Navy itself. We must improve the reserve. But the difficulty attending this course is that, in war time we should need the reserve men in the Merchant Navy, as well as in the Royal Navy. This difficulty, however, must attach, though of course, in a less degree, to foreign services. We say in a less degree, because the foreign Powers might possibly retire into their shells and withdraw their merchant ships from the

seas. This we could not do because we are so absolutely dependent on sea-borne food. Finally, there is a chapter on ship-building abroad. We see how foreign nations exercise a wise liberality towards their mail steamers which in war time will make so good a return to them. We do nothing of the kind and our niggardly policy here may one day prove a source of serious misfortune.

Regarding the book as a whole we must reiterate the remarks of previous years. The book is invaluable to all connected with the Navy of the world, at home and abroad, and it is largely to Lord Brassey that we owe the birth of that intelligent public opinion which, growing year by year, has done so much to keep the Navy always in the front and always apart from party politics.

### Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from April 10th, to May 8th, 1895.

- 7226 A. Tomkinson. Rotary motor or pump.
- 7227 S. S. Walker. Valves.
- 7247 J. P. Holland. Submergible boats.
- 7250 H. Moore. Marking gauge.
- 7254 J. and H. Bridge. Valves.
- 7849 E. M. Edwards. Safety valve for boilers.
- 7859 A. Evette. Circulation of water in steam generators.
- 7360 E. J. Hough. Design and construction of lifeboats.
- 7425 H. Simmonds and J. Delaney. Furnaces.
- 7438 G. F. Lawrence. Steam and other engines.
- 7440 J. C. A. Marckmann. Fire bridge for furnaces.
- 7449 M. Mittag. Fastening for machine belts.
- 7469 J. Walker. Friction clutches.
- 7496 J. Pyle. Heating water by means of steam.
- 7509 J. Atkinson. Form of ships.
- 7513 F. Fuhrmann. Method of forming flanges.
- 7518 F. W. Crossley and H. W. Bradley. Internal combustion engines.
- 7554 A. E. Ray. Boat reflector.
- 7590 G. A. Petersson. Boat rudder and propeller.
- 7605 F. G. Treharne. Preventing corrosion.
- 7648 H. Schon. Apparatus for raising sunken vessels.
- 7658 J. L. Waldaytel. Firebar.
- 7663 P. H. Rosenkranz, E. A. Dreyer, and A. Drcop. Pressure gauges.
- 7666 C. A. and O. W. Hult. Rotary steam engines.
- 7707 E. F. Wailes. Construction of stern parts of ships.
- 7742 O. Hawkins. Greasing the sides of ships.
- 7747 J. F. Weatherley. Petroleum engines.
- 7763 J. B. Barker. Metallic packing for pistons.
- 7819 A. E. Rowland. Form and action of valves.
- 7823 T. Cole. Protector for water-gauge glasses.
- 7857 A. J. Boulé (E. Hirsch, Germany). Furnaces.
- 7902 N. Christiansen and J. Carstairs. Governor.
- 7929 C. C. Braithwaite and J. H. Hosgood. Packing.
- 7938 J. J., T. F., and J. W. Meldrum. Supplying of air to steam generators.
- 7946 J. R. Sandilands and H. S. Clement. Increasing the draught in steam generators.
- 7954 J. Gutmann. Life-saving ship.
- 7995 J. Bilbie, T. Waterhouse, and L. G. Verdy. Governors.
- 8022 F. W. Engelbach. Finding the true points of the compass.
- 8032 G. C. Mackrow. Ships' fittings.
- 8036 E. T. Hughes (G. P. Woelfel, United States). Pipe wrench.
- 8043 A. G. Mumford. Steam generators.
- 8045 P. R. J. Willis (S. A. Royster, United States). Governor for motors.
- 8047 A. Reichwald (the firm of Fried Krupp, Germany). Perfecting steel armour plates.
- 8059 H. H. Lake (The Ingersoll Sergeant Drill Co., United States). Valves and valve-gear for engines.
- 8090 J. B. Starbuck. Engines for driving twin screws.
- 8091 A. E. Westwood. Ventilating muffles for furnaces.
- 8098 J. and J. Pollard. Valves for cylinders.
- 8100 C. Körte and E. Whitley. Friction clutches.
- 8104 J. McCain. Anchors.
- 8105 S. M. W. Croakery. Sextants and other instruments.

- 8110 T. H. Hoyle and F. L. Moorhouse. Closing water-tight doors.
- 8114 J. B. Delpiano. Stoppage of vessels, &c.
- 8129 W. Griffiths and J. W. Cunrey. Treating feed-water.
- 8149 P. Giffard. Pumps.
- 8150 P. Giffard. Valves.
- 8158 T. H. Holmes. Piston-rod packing.
- 8159 A. H. Church. Armoured piping or tubing.
- 8160 G. Fletcher. Trap for condensed steam, &c.
- 8171 A. Case. Increasing motive power of engines.
- 8181 W. Walters. Navigable vessels and structures.
- 8245 E. T. Darke. Tubular steam generators.
- 8268 I. Thompson and J. Liversedge. Metallic packings.
- 8271 J. Robertson. Steam and sailing vessels.
- 8292 J. A. Morris and W. T. Hatch. Lubricators.
- 8298 A. Bollinckx. Piston valves for engines.
- 8297 A. Reichwald (the firm of F. Krupp, Germany). Armour plates.
- 8354 J. Smith. Ships' rudders.
- 8396 P. Frenzeny. Tidal power motor.
- 8412 A. H. Moses. Rotary engines.
- 8443 B. F. Sparr. Screw propellers.
- 8472 T. D. Rose. Steam boiler construction.
- 8475 W. and T. H. Ackroyd and J. Willoughby. Circulating water.
- 8477 J. F. Henson and T. Warsop. Screw propellers.
- 8492 J. W. Ray and R. C. Saxby. Ships' telegraphs.
- 8493 J. W. Ray and R. C. Saxby. Ships' telegraphs.
- 8500 R. D. Smillie, W. Douglas, and W. R. Buchanan. Pipe.
- 8508 G. W. Schermerhorn. Hulls of vessels.
- 8510 E. Yates. Steam traps.
- 8532 M. Arndt. Regulating admission of air to furnaces.
- 8547 G. H. O. Brunswick. Life-buoys.
- 8581 J. P. Rogers. Ships' logs.
- 8586 L. Katzenstein. Bulkhead doors.
- 8589 W. Smith. Boiler tubes.
- 8607 T. Lees and W. Douglas. Packing boxes, &c.
- 8621 S. Whittaker and G. H. Richmond. Brake for steamships.
- 8623 S. Whittaker and G. H. Richmond. Packing for engine glands.
- 8625 J. Beevor. Protecting ships from torpedoes.
- 8655 J. Shepherd and Davy Bros. Steam generators.
- 8682 G. Fowler. Joints of steam pipes and connections.
- 8684 J. Pursell. Resistance to thrust of engines.
- 8686 J. E. Meredith. Metallic connections of beltings.
- 8694 G. Rhodes. Regulating draught in furnaces.
- 8712 Caddy & Co., Limited, and L. Edwards. Furnaces.
- 8717 H. Ferns. Oars.
- 8720 J. S. Comrie. Lights used for marine purposes.
- 8743 A. F. Hall. Steam engine indicators.
- 8745 H. Heine. Valve.
- 8747 H. Ingreys and G. Deans. Lubricators for engine cylinders.
- 8761 S. Douglas. Propelling ships.
- 8771 W. Thomson and N. Collins. Engine governors.
- 8772 E. A. Martin. Furnaces.
- 8781 M. S. Darnell and C. Carter. Engine pistons.
- 8799 G. Poccardi & Co. Safety valves for boilers.
- 8846 W. B. Austin. Steam generators.
- 8848 J. Spencer. Reverberatory furnaces.
- 8852 L. Pickard. Feed-water purifying apparatus.
- 8854 J. G. Smart. Pipe wrenches.
- 8867 H. Grosvenor. Manufacture of armour plates.
- 8869 J. G. Kincaid. Rudder posts of steamships.
- 8870 J. Smale and D. J. Jenkins. Ships' lantern.
- 8878 W. H. Swainston. Side furnace bars.
- 8880 J. M. Briggs. Apparatus for propelling ships.
- 8885 F. O. Prince. Apparatus for stoking furnace fires.
- 8893 M. T. Neale and C. E. Monkhouse. Submarine signalling.
- 8909 J. D. Ellis and J. Nodder. Steam boiler furnaces.
- 8910 J. D. Ellis and J. Nodder. Steam boiler furnaces.
- 8926 W. R. Patterson (C. E. W. Fleming, New Zealand). Ships' davits.
- 8929 M. Paul. Steam engines.
- 8933 R. S. Baxter. Controlling and reducing valves.
- 8951 P. J. McCabe. Constructing screw propellers.
- 8970 J. G. Lowe. Wrenches.
- 8992 C. Davy. Operating the valves of steam engines.
- 8998 G. Gorham. Apparatus for night signalling at sea.
- 9018 J. Bell, W. C. Melville, and J. W. Foster. Wreck raising appliances.
- 9019 J. Bell, W. C. Melville and J. W. Foster. Winches.
- 9026 W. Schmidt. Steam boilers with superheater.
- 9038 A. G. Melhuish. Internal combustion engines.
- 9062 P. O. G. Kretschmer and A. R. Liddell. Navigable vessels.
- 9067 R. W. Barker (F. Schreidt, United States). Safety valves.
- 9069 S. Stuart. Construction of ships and other vessels.
- 9110 G. S. Fleming. Steam boilers.
- 9115 F. Reddaway. Flexible armoured hose.
- 9116 F. Reddaway. Flexible hose for transmitting steam, &c.
- 9123 W. H. Wilson. Automatic closing valves.
- 9128 G. G. Rhodes. Boilers.
- 9180 C. K. Welch. Valves.
- 9138 J. Fairlie. Traveller for ships' spankers.

## BOARD OF TRADE EXAMINATIONS.

### Extra First Class.

April 27th, 1895.—Downs, S. .... Ex. 1C North Shields  
 " " " —Fieden, B. P. .... Ex. 1C London  
 " " " —Ward, A. A. .... Ex. 1C North Shields

NOTE.—1C, denotes First Class; 2C, Second Class.

April 27th, 1895.

Browne, Lind. . 2C Cardiff	Coulson, Wm. . . 2C N. Shields
Chegurn, Thos. 2C London	Dunn, Wm. A. . 1C "
Clennell, Frank 1C "	French, Wm. H. 2C London
Connell, James 2C Liverpool	Gray, Wm. .... 2C N. Shields
Elder, R. G. . . 2C London	Hamling, T. P. 1C "
Flockhart, P. M. 2C Liverpool	Hardy, James. . 2C "
Hemmings, Hy. 2C London	Hope, Thos. J. . 1C "
Hill, Fred. .... 2C Cardiff	Jasper, Geo. . . 2C London
Jennings, Thos. 1C London	Jennings, Fred. 2C Hull
McKenzie, A. . . 1C "	Le Blique, Louis 2C N. Shields
Moor, W. A. . . 1C "	Muse, James G. 2C "
Rae, James A. . 2C Liverpool	Nichols, Wm. H. 1C Hull
Roberts, David. 2C Cardiff	Nicholson, J. F. 2C "
Robinson, H. R. 1C Hull	Philip, Stewart 1C London
Robson, Jacob. . 2C London	Robson, Jno. H. 2C N. Shields
Shaw, E. H. . . 2C Hull	Ross, Geo. M. . . 2C "
Thompson, E. G. 1C Liverpool	Russell, John . . 2C London
Waites, W. A. . . 1C Hull	Smith, Wm. . . 1C N. Shields
Winn, F. A. . . 1C "	Sully, John .... 2C "
	Webster, Robert 2C Hull
	Williams, Lewis 2C Liverpool

May 4th, 1895.

Bolton, Richard 2C N. Shields  
 Bridge, Harold . 2C Liverpool  
 Brown, Hugh . . 1C Glasgow  
 Christian, Wm. 1C Liverpool  
 Crookshank, B. . 2C "  
 Davidson, D. . . 1C Glasgow  
 Deacon, Patrick 1C "  
 Fell, Joseph T. . 1C Liverpool  
 Gollan, Wm. P. 1C Glasgow  
 Hadjidemetrius. 2C London  
 McLay, Henry 2C N. Shields  
 Hobkirk, C. H. . 1C "  
 Hutton, Peter . . 2C Glasgow  
 Lindsay, John. . 1C Liverpool  
 Margaritis, Geo. 2C "  
 McAah, C. W. . . 1C N. Shields  
 McLay, John . . 2C Glasgow  
 Miller, James M. 2C "  
 Napier, John . . 2C N. Shields  
 Raffey, Chas. E. 2C Liverpool  
 Sharp, Harold F. 1C N. Shields  
 Sharp, Joseph . 1C "  
 Turnhull, Joseph 2C "

May 18th, 1895.

Aitchison, Wm. 1C N. Shields  
 Ashburner, G. P. 2C Liverpool  
 Baston, James. 2C N. Shields  
 Brown, James. . 1C Liverpool  
 Burnett, John. . 2C Greenock  
 Doig, William. . 1C N. Shields  
 Farrugia, V. . . 1C Leith  
 Fraser, David. . 2C "  
 Greston, Arthur 2C London  
 Hollins, Geo. O. 2C "  
 James, Walter. 1C "  
 Jones, Walter. . 2C Liverpool  
 Logan, Robert. 2C Greenock  
 McEwen, James 1C N. Shields  
 Munro, Charles. 2C Greenock  
 Nicholson, S. . . 2C N. Shields  
 Noble, William 2C Leith  
 Palmer, George 1C Greenock  
 Prahm, John . . 2C London  
 Purves, David A. 1C Greenock  
 Roper, Fred. C. . 2C London  
 Ross, Alexander 1C Greenock  
 Shields, Fred . . 1C Dublin  
 Smiley, Nelson. 1C "  
 Smith, James . . 1C Greenock  
 Swinny, Robert 2C N. Shields  
 Tucker, H. J. T. 2C London  
 Woodend, Jas. . . 2C "  
 Young, Alex. . . 1C Greenock

May 11th, 1895.

Bourdeaux, C. . 1C London  
 Brennan, A. E. . 2C N. Shields  
 Burdick, A. G. . 2C London  
 Church, R. .... 2C N. Shields

# The Marine Engineer.

LONDON, JULY 1, 1895.

THE Naval Defence Acts of 1889 and 1893 have served one good purpose at any rate, inasmuch as, owing to a large number of similar ironclads and cruisers having been built under those Acts, both in the Admiralty Dockyards and under private contract, for the first time a direct comparison is possible between the cost to the nation of such vessels when built at the Government Dockyards and when built by private tender. It is a great feather in the cap of the present administration of H.M. Dockyards that they are in a position to submit their cost sheets for comparison with contracts by private building firms. We think we may say that there has always been a lurking feeling in everyone's mind that no Government Department is or can be administered with the same economy as a private commercial firm, but we are glad to see that results have proved to the contrary with regard at least to our largest ironclads. These facts have been communicated by Dr. Elgar, late director of H.M. Dockyards, to the Institution of Naval Architects, at their late Session in Paris. The system of accounts formerly in use at H.M. Dockyards did not furnish the requisite data for analysing in detail the cost of work upon a new ship, or for comparing the cost of similar work in different ships and at the different Dockyards. The cost of materials charged to the building of a ship were kept quite independently of the departments that kept the cost of labour, and the "grouping" of the respective accounts of labour and materials being quite diverse from one another, and independent of the specific ship upon which the labour and material had been expended, it was quite impossible to obtain analytical results for any specific portion or department of the work. This condition of accounts it is obvious would but tend to foster a belief in outsiders that the accounts were so arranged as to cloak mismanagement and want of economical administration, and it was therefore greatly to the credit of the management of 1887 that this system of accounts was then abolished and a new system adopted, assimilated to the method of prime cost adopted by all private shipbuilders, though differing in details. Estimates by the Departments and actual cost can now therefore be rigidly prepared, and the progress of expenditure can be closely watched. Every credit is due to the Administration that they have come out of this rigid analysis with such flying colours. Published accounts now give the complete cost of five out of eight first-class battleships, two of which were

built by contract and three in the Dockyards. Adding one other not quite complete in the Royal Dockyards, with the estimated addition to complete, and two others not quite complete on contract with private firms, we get a direct comparison between four constructed in H.M. Dockyards, as compared with four completed under private contracts. We are glad to find that in these first-class battleships H.M. Dockyards have beaten private enterprise by an economy in prime cost of nearly £40,000 per vessel, on an average over the eight vessels. The differences of cost of work, to the credit of the Government Dockyards, appears to be due, not very much to differences in prices of materials, or rates of wages, but chiefly to the extent to which the various yards are laid out, and are equipped with machines and appliances for performing this class of work with facility and economy, and at a minimum of expenditure for the transport and handling of materials and the employment of labour upon them; and also to the good organization of the labour with reference to the special requirements of the work, and its advancement in all the various departments, or sections, in such order and at such rates as contribute most effectively to the general progress and economy of the whole. It is not perhaps surprising that H.M. Dockyard should have proved the best equipped to deal with the heaviest class of ironclads, or that, as we may hope, there is a fair net profit to the private contractors, after deduction of prime cost and maintenance, which the Government Department does not look for. In the case of first-class cruisers the Dockyard still holds the palm, but in the case of second-class and third-class cruisers the private firms have beaten the Dockyards, owing, presumably, to the fact as defined above: that the private dockyards are more at home and more perfectly equipped for this class of work than for the heavier. By this comparison both H.M. Dockyards and the private shipbuilding firms may each learn something from the other.

THE most economical and durable method of sheathing ships to prevent fouling is a subject of great interest to all, and a most valuable contribution on the subject, from the experience of the Admiralty, has been communicated to the Institution of Naval Architects by Sir William White. The only records available up to the present time have been those contributed by the late Mr. Grantham, in 1869, chiefly based upon experience gained with the composite ships of the Mercantile Marine. In the Royal Navy wood had been largely—indeed, chiefly—used in the construction of various classes of unarmoured vessels. The information now given is essentially as regards

the behaviour of sheathing applied to complete iron or steel hulls, and as this has been practically outside mercantile experience, the procedure has been necessarily experimental in the Navy to a large extent. There has been considerable divergence of opinion as to the best metallic sheathing to be used on iron and steel ships. The advocates of copper and zinc respectively had each strong points to urge: galvanic action between iron and steel and copper, in which the former would be the sufferers, was feared, whereas it was pointed out that zinc in its relatively electrical position to iron and steel would practically protect the latter. Under the test of experience zinc, though protecting the iron and steel, has failed to recommend itself as a material that would maintain a clean bottom. The formation of insoluble salts on the zinc, by the action of the sea-water, soon causes serious roughness on the bottom and tends to fouling. On the whole the conclusion has been arrived at that the extra expense of external copper sheathing, as compared with zinc, is more than repaid on subsequent service by economy of coal and maintenance of speed. What remains then is to find the most durable and economical way of mounting such copper sheathing on iron, or steel hulls, and to neutralize the tendency to destructive galvanic action upon the iron or steel. It was first attempted to produce these results by laying two skins of wood planking between the iron skin and the copper, the inner planking being attached by through bolts to the iron skin and the outer planking to the inner by brass screw bolts passing into, but not intended to pass through, the inner layer. This arrangement has not, however, given satisfactory results so far as our Navy is concerned, the planking having been permeated by the sea water and electrical continuity with corrosion having been set up. Sir William White, after full consideration has laid down the principles of what he believes to be the most effective system as follows:—(1) The adoption of such a thickness of single plank sheathing as will admit of thorough caulking. The mean finished thickness of teak accepted is 4 inches for large ships and  $3\frac{1}{4}$  for the smaller classes. (2) The use of naval brass bolts and nuts with their points screwed through the skin plating and with thin plate washers fitted underneath the nuts. (3) The thorough water testing of the skin plating before planking is worked. (4) The most careful fitting of the planks, the coating of all faying surfaces with suitable compositions, and subsequent injection of composition after the planking is in place. (5) The use of hempen grommets steeped in red lead under bolt heads and plate washers. Six years' experience has fairly shown that such a sheathing is satisfactory and practically watertight. The skin when so sheathed may be practically reduced in

thickness as compared with an unsheathed hull, and the minimum of planking is required. In case of injury the single planking is easily and cheaply removed for repairs. Careful observation in the Royal Navy in European waters have shown that after five or six months afloat unsheathed ships have required 20 to 25 per cent. more power to maintain ordinary cruising speeds than when clean, and after ten to twelve months this increase of power required would amount to from 40 to 50 per cent. For vessels, therefore, that have to keep the sea for twelve months without docking, the conclusion is irresistible that they must be sheathed to maintain their speed efficiency, and that the saving in docking and cleaning expenses and in fuel must be a handsome return on the extra expense of sheathing.

MONSIEUR BERTIN, the director of Naval Constructions to the French Government, has supplemented a former communication to the Institution of Naval Architects by some carefully worked out diagrams of the normal increase and decrease of the amplitudes of rolling on a non-synchronous wave, that is, in the author's opinion, in the most usual conditions of rolling; and further shows curves to indicate the diminution of such amplitudes when opposed by a resistance of the hull, various curves being given for a corresponding variety of coefficients of resistances. This practically theorizes in a plain and easily understood diagrammatic manner the startling results in the diminution of rolling practically testified to by Sir William White in his paper on "Further Experience with First-class Battleships," in which their conduct, when provided with bilge keels, surprised all experts at the time in regard to the great reduction of amplitude of rolling by such keels. Mons. Bertin thus confirms that in bilge keels is found a more powerful method of checking heavy rolling than had been foreseen, and considers that in proportion as the study of passive resistances to rolling is followed up by naval architects they will find long-neglected resources in dealing with rolling which they are now learning to turn to account.

THERE will be no excuse for the masters and captains of our Mercantile Marine for the future, why they should not be scientifically posted in the exact condition of stability of their vessels before starting on a long voyage, when we find such a simple meter for actually and experimentally determining the actual metacentric height of any vessel according to its loading. This instrument is termed by its devisors, Mr. Archibald Denny and Mr. William Gray, the head of Messrs. Denny's scientific staff, the "M.G. Meter," and a full



description of its characteristics and employment was communicated by Mr. Archibald Denny to the Institution of Naval Architects. The indications are effected by the movement of a definite weight through a measured distance on either side of the centre of the ship and a record is taken by adjustment of a spirit level as to the inclination caused by such movements. The weight (in tons) shifted, multiplied by the distance (in feet) that it is moved, and divided by the displacement (in tons), gives the shift of the centre of gravity of the ship. This is set off on a vertical scale, and a pivoting straight-edge is set to this point on the vertical scale, and thus gives a reading on another scale of the metacentric height. This seems quite simple and well within the ability of a captain or mate to

the amount that an equivalent sized pipe will pass. Another important matter that is always to the fore with users of valves is the question of repairs, which in many instances becomes a serious item, not so much on the matter of substitution of new material for that worn out, but in the amount of time spent by a skilled artizan in making the repair. It is with these points in view that Messrs. Humble & Barker have designed the various forms of their patent valves which we have pleasure in bringing to the notice of our readers in the adjoining illustrations and in the following description relating thereto. Figs. 1 and 2 show a plain and sectional elevation respectively of the high-pressure full-way screw-down stop valve, from which it will be noticed that when the valve is opened to the fullest extent a perfect clear way exists for the flow of liquid. The valve is guided and restrained from turning by three vertical and parallel

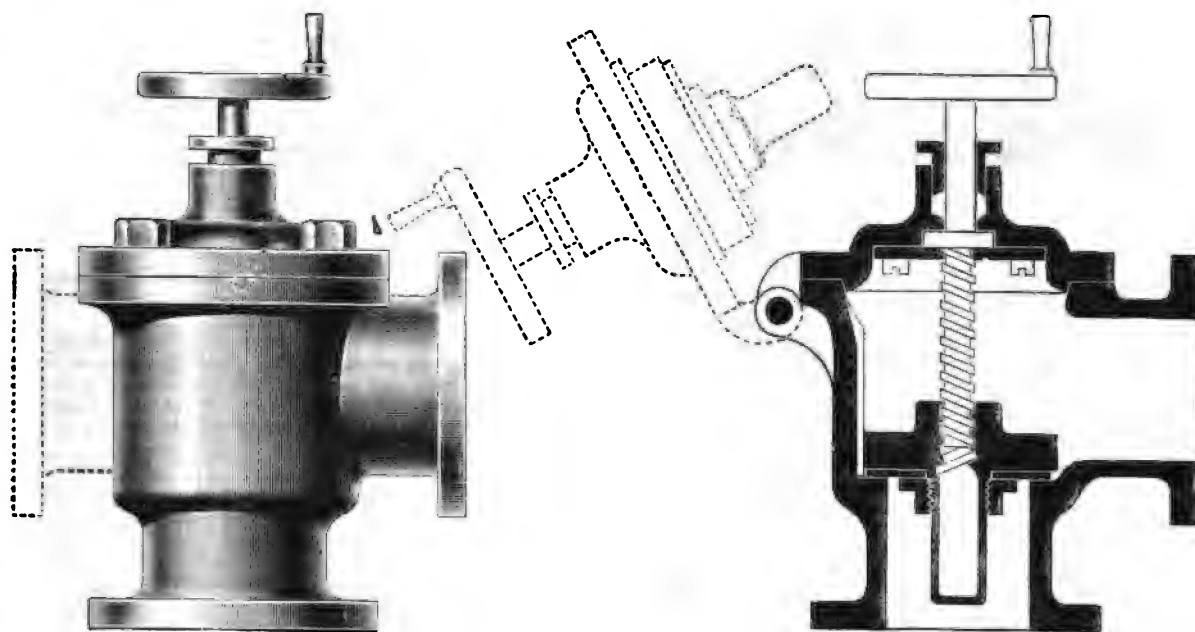


FIG. 1.

FIG. 2.

execute. Advice is given by Messrs. Denny that a minimum amount of metacentric height for safety is 8-10ths of a foot, but the captains would soon learn to know what height gave them the requisite amount of comfort for their own vessel.

### HUMBLE & BARKER'S PATENT VALVES.

IT would appear to any ordinary person that if a valve or tap be required for any particular purpose, there would be no difficulty in obtaining the article, and as an actual fact there would be no difficulty if people could get a valve which gave a clear passage of full area equivalent to that of the pipe or orifice to which it is to be attached. We do not think we are exaggerating when we say that 90 per cent. of the ordinary taps or valves of the regular trade stock pattern will not pass through the internal passages

ribs on the interior of the valve-box, which engage into suitable notches, or recesses, in the edge of the valve-disc. The material which makes the joint between the valve and its seating is in the form of a ring and is maintained in place by a nut on the underside of the valve. The spindle, which is adapted to turn in and bear against the top cover, is provided with a screwed portion, which is engaged with a thread formed in the valve disc. The spindle passes down into a closed tubular casing arranged on the lower side of the valve, and thus all chance of leak of liquid past the valve other than by the seating is entirely obviated. When the valve is screwed up into its uppermost position the whole of the operative mechanism can be hinged round out the valve-box for inspection and repairs without complete detachment from the valve-box. Figs. 3 and 4 illustrate a straight-through valve made according to Humble & Barker's invention. It will be noticed that when the valve is moved into its extreme open position a

perfectly unobstructed passage exists through the device. Figs. 5 and 6 show the patent valve arranged in the form of a bib valve.

An important feature in the design of these valves, it will be noticed, is the characteristic that the box and arrangement of the operative parts is such that a straight look through into the vessel or device to which they are attached is obtainable, and any obstacle, such as dirt, grit, ice, etc., can be easily removed. Further, the simplicity of their construction allows of their

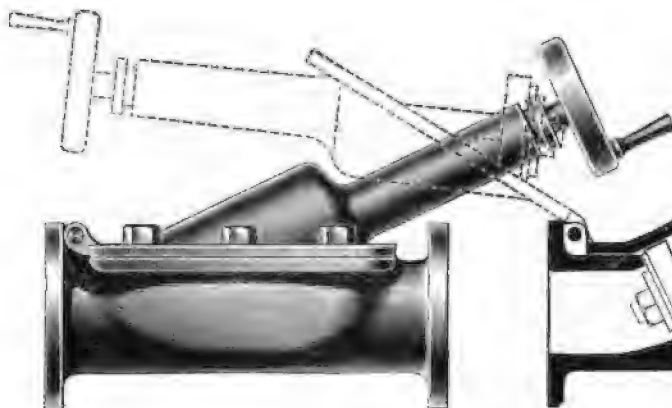


FIG. 3.

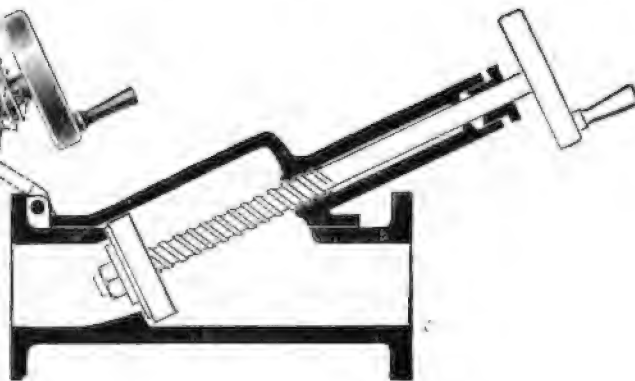


FIG. 4.

being repacked in a very few minutes by any engineman or attendant, it not being necessary to employ skilled labour or to execute any work on a lathe in the course of repair. These valves are being put on the market by Mr. Stephen Humble, jun., engineer, of the Metal Works, Emerson Street, Southwark, London, S.E.

formation of "steam chambers," or stationary steam, in the heating tubes, and by the strains due to the expansion of these tubes.

The temperature of a heating surface, behind which only steam exists, rises to such an extent that it rapidly becomes oxidised externally, by the hot gases, which are always mixed with oxygen, and internally by the steam. Moreover, the strength of the metal when thus over-heated is reduced, so as to render rupture probable.



FIG. 5.

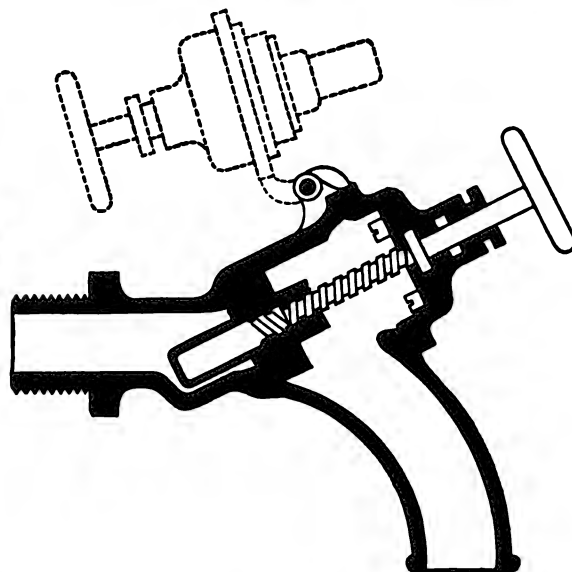


FIG. 6.

**John Brown & Co., Limited.**—The directors of John Brown & Co., Limited, have decided to recommend the payment of a further dividend on the ordinary shares of the company of 7s. 6d. per share, making, with the interim dividend paid in December last, 5 per cent. for the year.

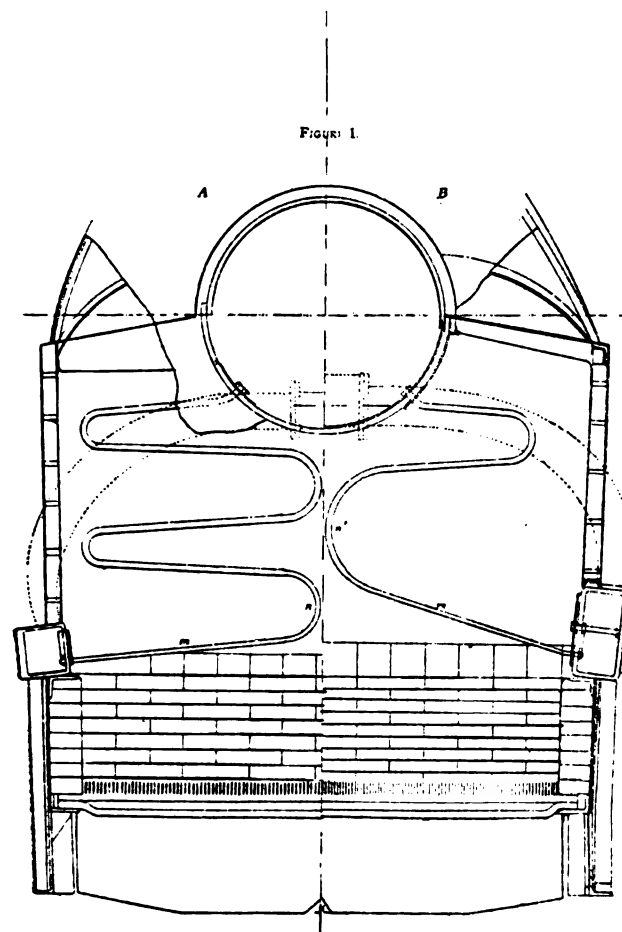
The formation of those "steam chambers" may be prevented by the following means:—

(a) The direction of the tubes, especially in their lower and more heated part, must be as vertical as possible.

\* Read at the Thirty-sixth Session of the Institution of Naval Architects Paris, June 13th.]

- (b) The circulation must be very active.
- (c) The proportion of length to diameter in the heating tubes ought not to be too large.
- (d) The section of the outside down-take or water return tubes, from the upper to the lower reservoirs, ought to be of large proportions.

In order to prove the above propositions, I shall consider (Fig. 1) the two older arrangements of the "Du Temple" boiler. Commandant Du Temple was the first to apply to steam boilers that most important principle of the return of water outside the fire, perhaps the greatest improvement for the last thirty or forty years.



The oldest form of large boilers is shown in A, and the second one in B. For the sake of clearness, only one tube is shown in both designs; but it is important to state that, the length of tubes in B being one-half the length of those in A, their number is doubled, the heating surface remaining the same in both cases. The arrangement B was applied for the first time, at my request, in the torpedo-boats *Lancier* and *Pernow*.

(a) The direction of the tubes, especially in their lower and more heated part, must be as vertical as possible.

An intense heat applied to the parts *m m'*, nearest to the fire, produces steam which may take two courses, viz., rise to the upper reservoir or go down in the lower one; it can also divide and go both ways.

In the first case, although the rise of water in the more vertical parts, *n n'*, produces an energetic circulation, the resistance to an upward motion is very great on account of the length of the tube. In the second case, the distance and resistance to overcome is very small, the more so as the pressure in the lower reservoir is always less than in the upper one, but the inclination of the tube opposes this course.

It is clear that, with very slow firing, the motion will take place in the right direction; but if sufficient heat is applied

steam is produced in abundance, and part of the steam will pass to the upper, and part to the lower reservoirs, interrupting the circulation, and allowing the tube to become empty and red hot. When the boat heels the phenomenon will take place soonest on the side where the tubes approach more nearly to the horizontal.

In arrangement B, where the angle with the horizon of that part of the tube considered is much greater (about three times), the bubbles of steam rise much more easily, drawing the water with them, the more so as the tube in arrangement B is only half the length of the tube in arrangement A.

It must be borne in mind that steam bubbles do not rise easily in a slightly inclined tube, even when the inside surface is quite smooth, which is seldom the case, even with steel, which is the only reliable material,\* especially after the tubes have been some time in service. To ensure an easy rising of bubbles a greater angle is necessary. This is especially important at the lower part of the tube, where the water enters and the heat is greatest. The most important thing is to set the water in motion in the right direction.

Mr. Thornycroft has shown that in the upper part of the tubes this rule could be dispensed with (it is evident that the tumble-down shape of the upper part of the Thornycroft tubes would never do in the lower part).

For many reasons I greatly prefer that the shape of the tubes should be always rising through its whole length, but I would be the last to deny that the Thornycroft boilers have done and are doing good service, and that they have had a great influence on the development of water-tube boilers.

To return to the "Du Temple" boilers, experience has repeatedly shown the superiority of arrangement B over the other one. The actual design patented under the name of "Du Temple-Normand" (which is different from "Normand's" boiler) is still better.

(b) The circulation must be very active.

This is nearly self-evident. The greater the circulation the cooler are the tubes.

It is well-known, moreover, how favourable is the agitation of water to the transmission of heat. Laboratory experiments have shown that the co-efficient of transmission varies from one to five, according as the motion of water is nil or very great.

Increase in the economic duty of the boiler means easier firing.

(c) The proportion of length to diameter in the heating tubes ought not to be too large.

Within the ordinary limits of the ratio of length to diameter the resistance to the motion of water is nearly proportional to this ratio. The circulation of water, so essential to the good working of a boiler, is reduced as the resistance increases.

Moreover, all the steam generated in the inferior part of the tube must pass through the upper end. The longer the tube the smaller the density of the fluid in the upper part, and the greater the chances of its being burnt.

(d) The section of the outside down-take or water-return tubes, from the upper to the lower reservoirs, ought to be of large proportions.

When the boiler is at work, the pressure in the inferior reservoir is always less than in the upper one. Should it be otherwise, the water would not flow down by the return tubes.

It is most probable that the steam generated in the heating tubes (or the air mixed with the feed) produces the circulation of water by impulse only.

This force of impulse is so great that when the tube is vertical the ascending motion of the fluid may be estimated by applying the theory of communicating vessels, according to the difference between the mean density of the heterogeneous fluid in the heating tube and that of the water in the return tubes, due allowance being made, of course, for friction.

When the heating tube is more or less inclined, the adherence of bubbles to the inside surface is such that this mode of reckoning would certainly give a much higher speed than is actually the case, the error being greater as the inclination of the tube approaches the horizontal. This affords another proof of the importance of verticality in heating tubes.

Should the soundness of these views be questioned, one thing,

\* Copper would certainly last much longer, but it is very dangerous, as, in case of bursting, the tube opens out fully, allowing the hot water and steam to escape through double the section of the tube. Ordinary brass becomes brittle and weak when over-heated. With mild steel the section of the orifice is generally small. Security against personal injuries surpasses all other considerations in importance.

however, is indisputable—the rise of water and steam in the heating tubes produces a difference of pressure between the upper and lower reservoirs, and this difference reduces the intensity of the circulation from which it is a consequence.

Accordingly, it is most important to lessen this difference in giving to the return tubes the greatest possible section.

The great engineer of Chiswick concluded from this fact that, since the difference of pressure reduces the circulation (which is quite undeniable), the circulation is greater with tubes rising above the water level.

With all due deference, may I be allowed to state that I draw from these trials entirely opposite conclusions.

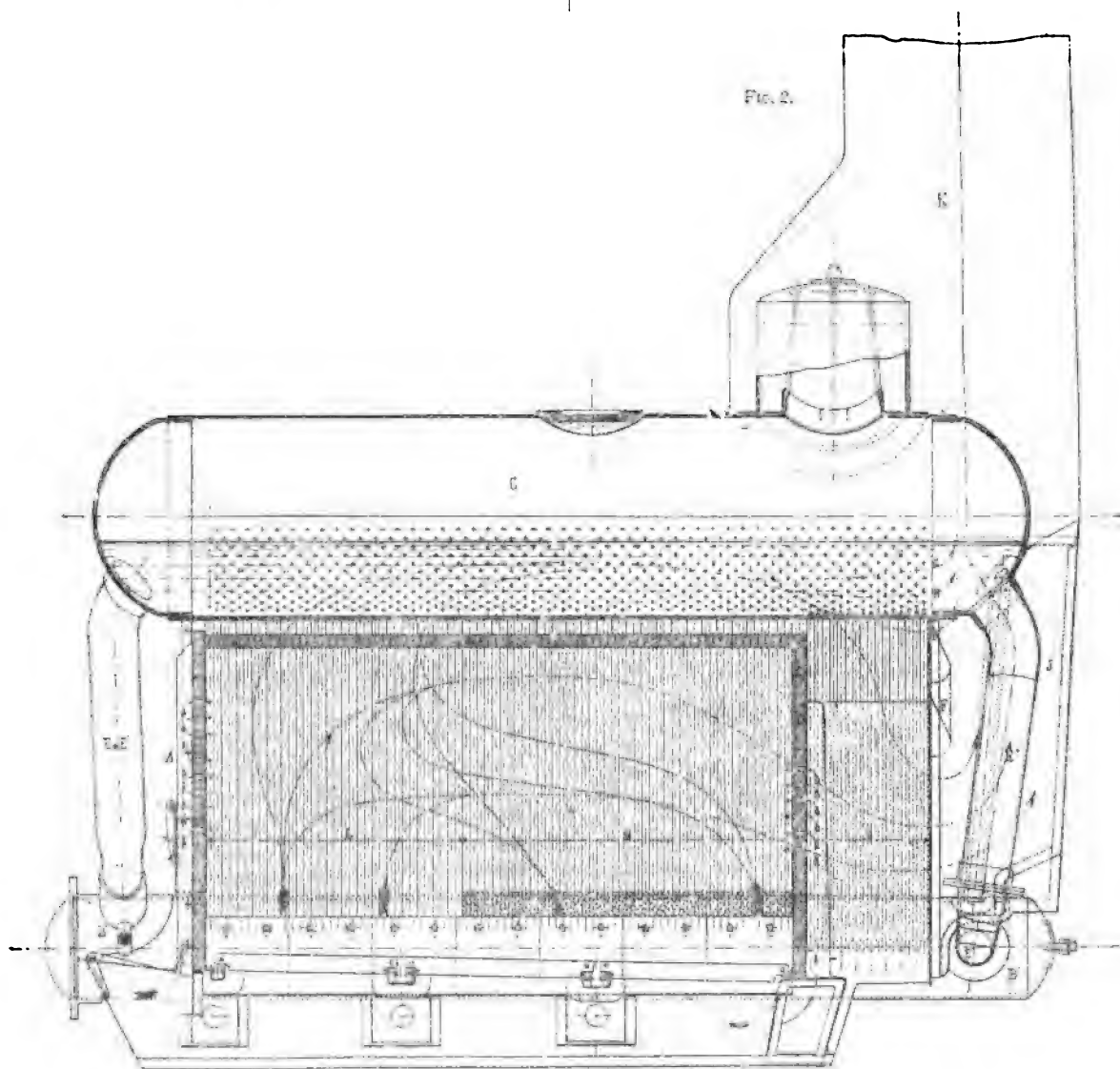
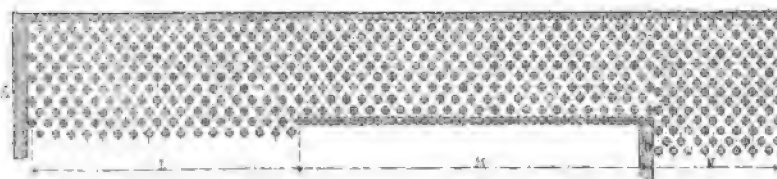


FIG. 3.



In a paper read last year at the Southampton meeting, Mr. Thornycroft described some very interesting trials made on two boilers, differing only in this—that in one of them the heating tubes rose above the level of the water in the upper reservoir, whereas in the other one the upper end of the tubes were under water. The difference of pressure between the upper and lower reservoir was found to be greater in the second than in the first case.

The dimensions of the outside return tubes being similar in both cases, and admitting that the total return of water takes place by these tubes, and not partially through some of heating tubes less exposed to the fire (which does not seem to be a very reliable arrangement), it is clear that the quantity of water which goes down through the return tubes will be proportional to the square root of the difference of pressure between both reservoirs. Now, this quantity of water is, by hypothesis,

exactly equal to the ascending water, so that it is, according to the trials, greater in the boiler where the upper end of the tubes is under water.

This conclusion is in accordance with the following probable theory, that the head of water which causes the circulation in a tube rising above water must be reduced by a height equal to that of the tube above the water level, due allowance being made for the smaller density of the fluid.

The under-water arrangements does not, perhaps, allow of so great a heating surface for a given encumbrance; but it offers the further advantage that no "steam chamber" can exist in the upper part of the tubes.

#### On Strains Due to the Expansion of Heating Tubes.

The second cause which limits the intensity of firing is the strains due to the expansion of the heating tubes.

Several well-known arrangements prevent these strains. For instance, that of the Belleville boilers, the use of Field tubes, as in the Collet-Niclausse boilers, and especially the adoption of heating tubes sufficiently long and sufficiently curved (both conditions are necessary) for preventing oblique strains on the junction with the tube plates.

It is also most important that no joints or riveting should be allowed in the actual vicinity of the furnace.

#### On the Influence of Active Circulation on the Transmission of Heat.

I have alluded already to laboratory experiments according to which the co-efficient of the transmission of heat varies from one to five, according as the water to be heated is quite stationary or in rapid motion. Particulars may be found in the "Traité de Physique industrielle," by Ser, vol. i., p. 225, &c. This is easily accounted for by this fact, that water is a very bad conductor of heat, and can be heated only by putting all the particles successively in contact with the heating surface.

Although the actual conditions of a boiler are very different from those of the experiments, especially as regards the temperature of the heating fluid, it is not less true that active circulation in boilers is most favourable to vaporisation.

This explains how the advantage to be derived from the use of feed heaters is always superior to that which results from the economy in the units of heat saved. This is especially to be noticed with Mr. Kirkaldy's feed heater. In this apparatus steam taken from the boiler heats the feed before its introduction into the boiler. The result is evidently to equalise, in a great measure, the temperature of the water and steam contained in the boiler with no apparent, though with an undeniable economy. The phenomenon may be explained as follows:—

When the water enters the heating tubes it travels without boiling through a certain length of those tubes, the lower its temperature is below that of the steam, the longer this distance; and, since the circulation is caused by the development of bubbles in the tubes, the intensity of the circulation is reduced as this difference of temperature increases.

For the last two years I have obtained the same result in the most simple manner by introducing the feed in the steam space under the form of spray, as far as possible from that part where steam is taken for the engines. The feed being already heated by steam having done work in the H.P. and M.P. cylinders, there is scarcely any difference of temperature between the water and steam in the boiler. As soon as the water enters the heating tubes, bubbles of steam are produced, and the circulation is increased to such a rate that the temperature of the tube is not higher than with cold feed.

This mode of introducing the feed, which has the further advantage of depositing the calcareous salts in the form of powder when using sea water, requires some very simple but particular arrangement, in order to avoid shocks in the feed pipes.

#### On Combustion.

The temperature of the products of combustion would be enormous and greatly superior to that at which dissociation of carbonic acid and steam takes place, if it could be completed in the fire-box.

Starting from this undeniable fact, some engineers think that heat should be progressively subtracted by cool surfaces during the combustion of coal.

This is certainly not the case. No cooling should take place during combustion, and the necessary dissociation of carbonic

acid and steam ought not to be avoided, provided sufficient air is admitted to secure further recombination.

In fact, the boiler grate ought to give the same result, though by different means, as the gazogene used in metallurgy; but all the necessary air should be given at once, the greater part passing through the grate, since it increases the draught, whereas that which is admitted above reduces it. It matters little for the final result whether air be admitted at one time for producing carbon oxide, and afterwards for completing the combustion, provided no free carbon exists in the hot gases before they are cooled by the cluster of tubes.

A very good proof of the soundness of these views may be found in the combustion of petroleum, which cannot give its total heat unless it takes place in a white-hot refractory receiver, where it is impossible to avoid dissociation.

The use of the brick arch in locomotive fire-boxes has proved equally advantageous for the complete combustion of coal, especially coal rich in hydrocarbons.

For the same reason it is most important to have high and large fire-boxes, where the hot gases are well mixed, and remain as long as possible before entering the cluster of tubes.

#### On the Section of Passage and Length of Travel of Hot Gases.

With a given capacity of boiler, the section of passage may be very great and the length of travel very small, or the section may be very small and the travel very long, with all intermediate proportions between these extreme limits.

In the first case the draught is good, but the heating surface is very seldom thoroughly utilised. In the second case a good air pressure is necessary, but the economic duty is better, because the hot gases are obliged to heat the whole of the heating surface, and because the transmission of heat increases with the agitation of gases, as it does in the case of water.

This was proved a great many years ago by some most important trials made in France by Mr. Geffroy, of the Northern Railway of France, on a locomotive boiler. (For details, see Ser., vol. i., p. 564.)

The evaporation was measured, first with all tubes open, and second with half the tubes only. In the last case, notwithstanding the enormous reduction of heating surface, the evaporation per pound of coal remained the same, with this difference only, that a greater air-pressure was necessary.

The conclusion to be derived is that the section for the passage of the hot gases should be reduced, and their travel lengthened as much as is consistent with the draught available.

The rules given above are certainly not the only ones necessary for making a good water-tube boiler, intended to resist intense firing, but they are certainly the most important.

In order to avoid all misunderstanding, I will show how they have been applied in Normand's boiler. My intention is not to make known an apparatus that has already been many times successfully tried in France and abroad, but I have chosen it because I believe it embodies more completely than any other the above principles.

In general appearance (see Figs. 2, 3, 4, and 5) the boiler is the same as that used since 1892, but the arrangement of the cluster of tubes is new, and has been applied on the three torpedo-boats lately delivered (Nos. 183, 184, and 185). This arrangement gives a higher economic duty than the former one.

Fig. 2 is a vertical longitudinal section.

Fig. 3 is a transverse vertical section through part L of the cluster of tubes.

Fig. 4 is the same, through part M.

Fig. 5 is a longitudinal section of one cluster of tubes through X Y.

The particulars of the boiler shown in the drawings are:—

Grate surface ... ..	39 sq. ft.
Heating surface ... ..	1,840 "
Number of tubes ... ..	1,284
External diameter of tubes ... ..	1 3-16 in.
Internal ... ..	1 in. bare.
Pressure ... ..	200 lbs. per sq. in.
Weight, with all valves, bricks, fittings, &c., without water ... ..	10 tons 9 cwt.
Total weight, with water ... ..	13 " 2 "

In No. 185 (single screw) the power of the engine was measured and found to be, at the official full-speed trial, 1,680 I.H.P.

Air pressure ... .. 3½ in.

Consumption of coal per hour ... ..	2,600 lbs.
" " " " per square foot	
of grate ... ..	67 "
Consumption of coal per hour per I.H.P. ...	1.56 "
I.H.P. per square foot of fire-grate ...	43 "
" " " " of heating surface ...	0.91 "
Mean temperature of feed ... ..	241° Fah.
" " " " gases in funnel ...	708° "

The fire-bars were too close; more air will be admitted in future.

At 14 knots the consumption of coal is under 1 lb. per I.H.P. per hour.

I will now show that the arrangements of this boiler are in accordance with the rules set down above.

As indicated by arrows, the hot gases enter on both sides of the boiler, the cluster of tubes L at the front end only, and through the whole height. They afterwards travel horizontally to the other end, where the funnel is situated.

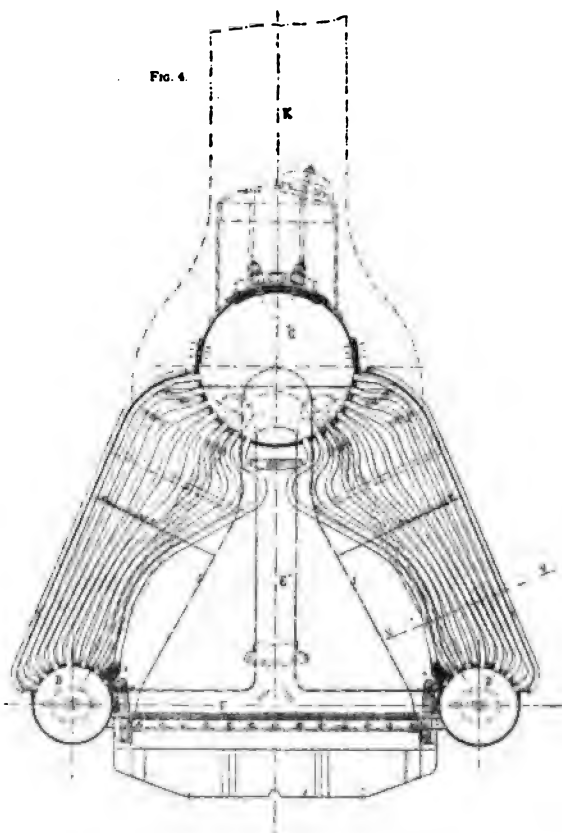
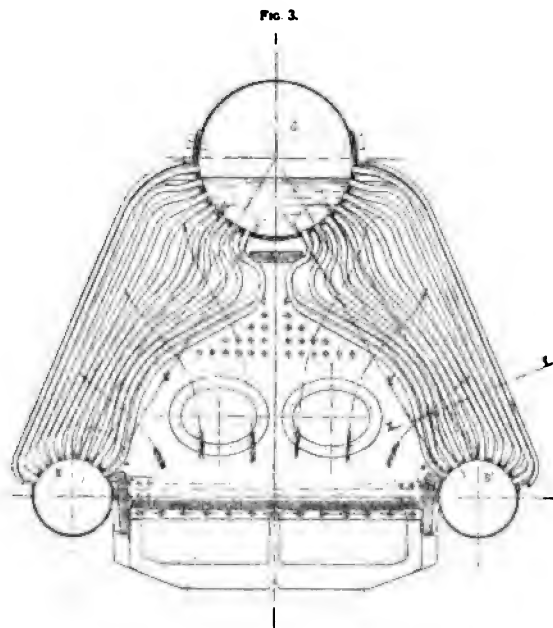
The section of passage of the hot gases is not so large that any part of the heating surface could be left out. Their length of travel is great, and the motion being perpendicular to the axis of the tubes is favourable to their agitation and consequently to the transmission of heat. On the other hand, it requires a higher air pressure.

Should a better draught be found necessary the width of the clusters of tubes might be increased.

The upper end of the tubes is under water, and the shape of the tubes is such that the formation of "steam chambers" is impossible.

Water circulation begins as soon as the fire is lighted. It becomes intense at full power. When the vessel is laid up, the boiler may be completely filled with pure water saturated with lime. No air can remain in the tubes. This is of great importance as regards durability.

It is indeed difficult to see why the firing could not be increased from what it was in the trial above mentioned if the tubes only



An inverted bridge, F, pierced with small holes, H, forces the gases to heat the lower part of the tubes before entering the funnel. Otherwise the upper part only would be heated.

The general direction of the tubes, especially in the more heated part, is such that bubbles of steam will rise easily, and that none of the steam produced can return to the lower reservoirs.

The height of the fire-box is very great, and the greater part of the flames and hot gases remain a long time in it, being obliged to come to the front before entering the cluster of tubes. The motion thus imparted to the flames is favourable to complete combustion.

The ratio of length to inside diameter in the longer tubes is 68, whereas in the former type A, of Du Temple boiler, it was 160 and 320 in type B. The curves of the tubes are sufficient to prevent any undue strains from expansion.

The diameter of the three return tubes is such that the difference of pressure between the upper and lower reservoirs must be very small. In boilers now building at my works the return tube at the funnel end has been dispensed with.

are taken into account. From my own experience, it is the durability of the fire-bars and bricks which limits the intensity of the fire.

Objections have been made about the necessity of removing several tubes, should one middle tube be damaged. The quality of mild steel tubes is such that they may be taken out and replaced without the least difficulty. No better proof can be given of the feasibility of this plan than the following:—the three boilers of Nos. 183, 184, and 185 were finished, when it was decided to alter the arrangement of the clusters, according to the new design. With very simple tools, hundreds of tubes were removed and replaced after having had their shape altered, without any of them being damaged.

Most of the principles laid down in this paper may appear to be so simple as to render their statement useless. It is not so, if we consider how very few of the different types of water-tube boilers are designed in accordance with all of them.

However, my object is not to criticise any of these types, when not intended for intense firing, although the best boilers for intense firing are also generally the best for slow work. Many



water-tube boilers are now making steam with tubes nearly horizontal, very low fire-boxes, great section of passage and short length of travel. Each can boast of particular advantages which cannot be disputed.

But the conditions imposed for boilers become more and more severe. In order to save weights, the combustion of fuel per square foot of grate increases every day; 20 lbs. is no longer sufficient, twice, perhaps three times as much will soon be expected for the most powerful engines. A good design will give the owner, the engineer, or the navy that adopts it a great advantage. It is worth while to examine how it will be possible to meet impending exigencies.

### WORTHINGTON SPECIAL PUMPING MACHINERY FOR MARINE USE.

THE Worthington Pumping Engine Co. have recently brought out several new patterns of pumping machinery for marine use, which combine in the highest degree, economy, efficiency, and accessibility to the various parts, with compactness, simplicity and strength of construction.

Fig. 1 shows a vertical marine pump having either

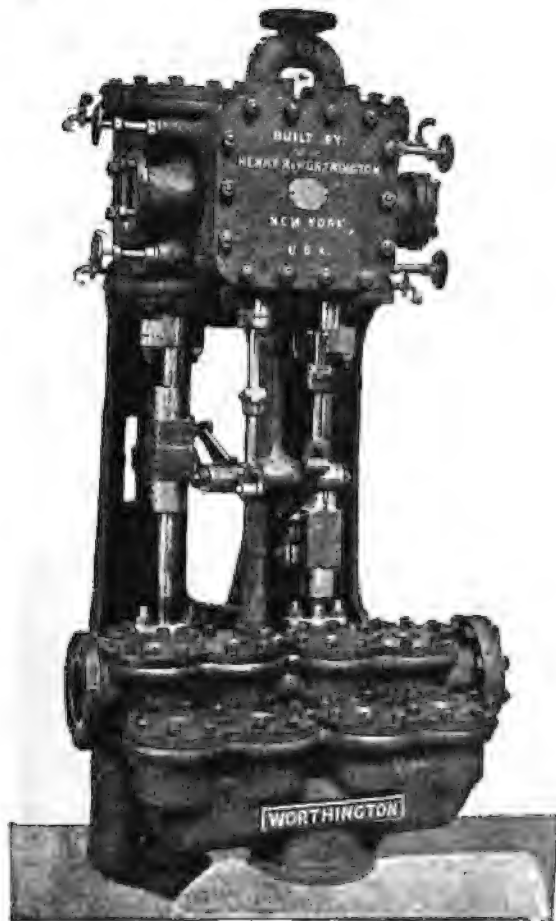


FIG. 1.

a gun-metal or cast-iron water end, and is intended for use on ship board, for main boiler feeding, fire or other service. It was specially designed to meet the requirements of service on cruisers, battleships, armoured vessels, torpedo boats and merchant steamers, where

an engine must occupy the least possible floor space and head room, have all its internal parts easily accessible, be simple and strong in its construction, and, by reason of its superior workmanship and quality require the least possible attention and repair. The water end is sufficiently strong to work

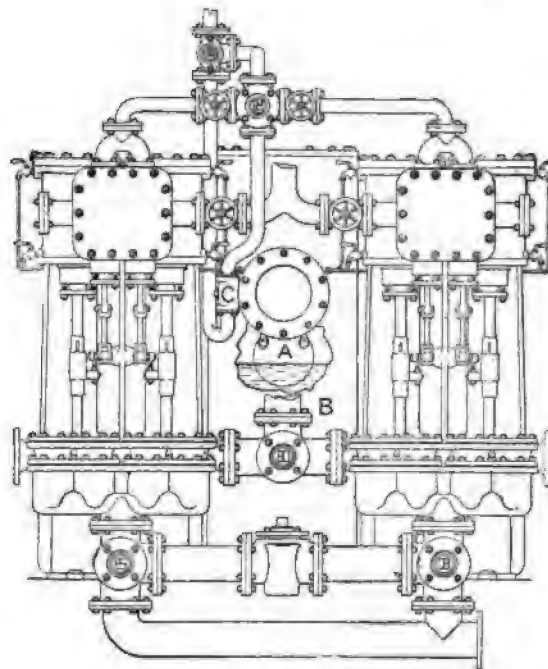


FIG. 2.

against pressures up to 250 lbs. The water passages are free and direct, and the water valves, which are all arranged in valve boxes at the front of the pump, are easily reached. The suction and delivery valves are in separate boxes, so that any one valve can be examined without disturbing the others. This arrangement will recommend itself to engineers and is an improvement on ordinary style of pump. The water pistons are accessible through the top of the cylinders, without disturbing either the steam pistons or valve motion, by means of the piston rod coupling shown.

For use on shipboard, it is customary to arrange the feed pumps so that the water is delivered to the boilers as fast as it comes over from the air pumps. This is usually accomplished by the use of a float in a tank or hot-well, which controls the speed at which the pumps are run, completely shutting off the steam from the pump, in case water fails to come over, and gradually opening the valve again as the water is delivered into the hot-well. This necessitates that the pump used for this service shall have no dead centre and shall always be in a position to start.

Fig. 2 shows the general arrangement of two-feed pumps with automatic regulator for this service, but which may be varied in detail to suit existing requirements.

In the arrangement here shown either pump can be made to pump from the hot-well to the boiler direct or through a heater. Fig. 3 shows generally the arrangement of Worthington Automatic Feed Pumps and Heater as fitted on shipboard.

The steam condensed in the surface condenser is delivered over by the air pumps into the hot-well, marked A. This delivery being intermittent, it is necessary to regulate the working of the pumps in order to ensure their always being completely filled with water. In the hot-well there is therefore a float which operates the valve B and controls the working of one of the pumps, gradually opening the valve as the water rises in the hot-well, and shutting it off in case the water is not delivered over as fast

pump, is forced by it into the feed supply pipe G leading to the boilers through the bulkhead at H.

On the exhaust trunk D is a valve L leading to the low-pressure casing, and any steam which is not utilised by the heater goes into the low-pressure cylinder and again does useful work ; or in the opposite case, if there is not enough exhaust steam from the auxiliaries to sufficiently heat the feed water, this valve can be used to regulate the amount of steam admitted to the heater to increase the temperature of the feed

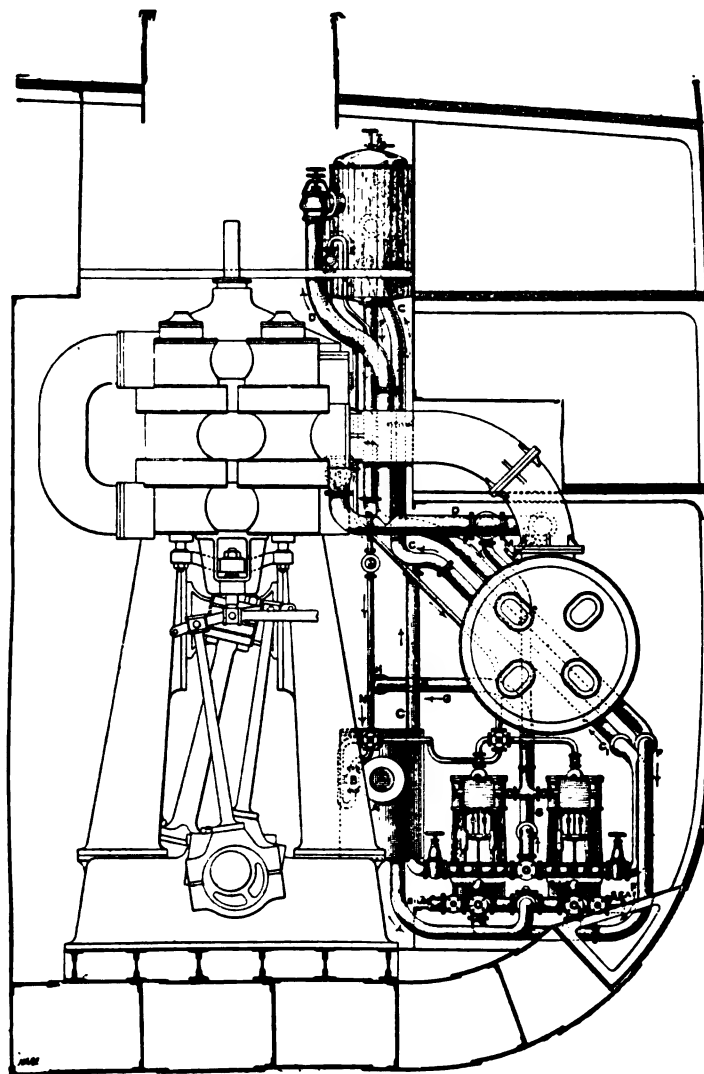


FIG. 3.

as the pumps take it away. The pump in connection with the hot-well delivers the water through the pipe C or C1, as the case may be, into the heater through the spray valve. The exhaust steam from the various auxiliaries, which is turned into the main exhaust trunk D, is conveyed to the heater, where it thoroughly mixes with and imparts its heat to the feed water. The water, as it accumulates in the heater, raises the float, which opens the steam valve E controlling the second pump, and passing from the heater down through the pipe F to this second

water to the degree desired. By the valve M the exhaust steam from the auxiliaries can be turned into the condenser when required.

These pumps are perfectly automatic. Either pump can be arranged, by the valves shown, to work in connection with the hot-well or the heater, or can be worked quite independently of the control gear by means of the three-way valve N, and used for pumping from the sea or for any other service that may be desired.

It is a matter of considerable importance, in case

of emergency, to have these large and powerful boiler feed pumps available for fire or general service, as in such cases they can be run at very high speeds; and moreover it entirely obviates the necessity of employing an extra set of pumps, which would be required when the boiler feed pumps are unsuited to any service but boiler feeding.

Particular attention is called to the fact that no packed valve stems or stuffing boxes are employed in connection with the governing device. This is an important and vital improvement upon the ordinary forms, and prevents entirely the jerky and unreliable action of the pump (often caused by the sticking of the packed valve stems), and is a feature that will be appreciated by all engineers.

The heater should always be placed at a considerable height above the pumps, and when it is desired to heat the feed water to the highest degree possible, this should not be less than 20 feet, in order to prevent any possibility of the pumps becoming filled with vapour, which might happen in pumping hot feed water.

Worthington Feed Pumps and Heaters have been adopted on some of the largest and most powerful passenger steamers afloat, and wherever introduced their results have been eminently satisfactory, and the saving has repaid the entire cost of fitting in a very short time. The economy obtained by thus utilising the exhaust steam from the auxiliaries rather than turning it into the condenser or into the low-pressure casing, as is often done, is sufficient to justify the Worthington Combined Pump and Heater arrangement being fitted on all classes of steamers.

The economical results thus obtained are much more considerable than would at first sight appear. Take for example a triple-expansion engine of 10,000 I.H.P., and using say 15 lbs. of steam per I.H.P. per hour; without any means of heating the water the temperature in the hot-well would probably not be

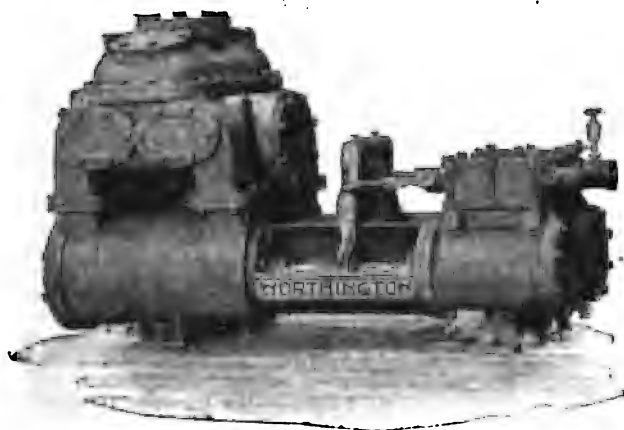


FIG. 4.

above 120 degrees, whereas by adopting the Worthington Heater the feed water might be raised by exhaust steam to 210 degrees, and considerably higher with live steam or steam from the intermediate casing; showing an increase of 90 degrees when using exhaust steam, which corresponds to 13,500,000 heat units

saved per hour. As 1 lb. of coal contains about 11,000 heat units, this saving would be about 1,230 lbs. of coal per hour, or say 13 tons per day; and if the steamer was working only 200 days in the year a saving in coal of 2,600 tons would be effected. This



FIG. 5.

would pay for the entire cost of Worthington Feed Pumps and Heaters several times over.

Where exhaust steam is not available, considerable economy is obtained by taking steam from the intermediate or low-pressure casing, or even live steam, besides the advantages gained from the use of hot feed water, in prolonging the life of the boiler by preventing the contraction and expansion which take place in using cold feed.

Fig. 4 shows a Worthington horizontal ballast pump originally designed to meet the requirements of shipbuilders for a thoroughly substantial and reliable pump. It will be observed that the proportions are such as to ensure large pumping capacity with the smallest expenditure of steam. This pump is of the packed piston type, and has the valves so arranged that the water pistons are always submerged, thus making it particularly well adapted for long and difficult suction lifts such as are met with in steamers carrying petroleum in bulk, and in steamers having extensive systems of water ballast tanks.

Fig. 5 shows a vertical form of ballast pump specially designed for large pumping capacity, with unusual compactness and moderate weight, it will be noted that it has the same advantages as regards accessibility of parts as the vertical feed pumps.

Both the horizontal and vertical ballast pumps can be made with brass valve plates into which the valve seats are screwed, thus preventing the chemical action which arises when brass seats are screwed into an iron casting.

Fig. 6 shows one of two air-pumps supplied to each of the American Line steamers *St. Louis* and *St. Paul*, each air-pump for use in connection with an engine developing 10,000 H.P. This is a modification of the well-known Worthington form of valve motion, and is quite a departure from the usual forms of independent air-pumps; all parts are easily got at, and in case of accident are readily repaired.

For excellence of design, and thoroughness with which the details of Worthington pumping machinery are carried out it is hardly necessary to comment

## ON COUPLING BOILERS OF DIFFERENT SYSTEMS.\*

By Monsieur PIERRE SIGAUDY, Engineer-in-Chief of the Société des Forges et des Chantiers de la Méditerranée; Member.

ALTHOUGH water-tube boilers may offer great advantages, they do not seem to many people trustworthy enough to be exclusively employed in a great number of cases. The plainest manner to convince those who are frightened is, I think, to fit effectually together the old and new system of boilers on the same ship, thus giving the possibility of getting up steam quickly which is generally of great importance. This idea has been treated lately by *Engineering* with a view to



FIG. 6.

upon, the reputation of the machines built by this company is thoroughly established and undoubtedly are the standard for all classes of pumping machinery.

"*Ursula*."—On June 26th there was launched by Messrs. Cochrane & Cooper, Beverley, a new steam trawler, of the following dimensions:—98 ft., by 20 ft. 6 in., by 11 ft., built to the order of the Grimsby Union Steam Fishing Co., Limited. The vessel will be fitted with 40 N.H.P. triple-expansion engines by Earle's Co., of Hull. As the vessel left the ways she was named the *Ursula* by Miss Dorothy Letten, of Grimsby. After the launch the company proceeded to the Beverley Arms, where luncheon was partaken of, and the usual toasts proposed.

Navy use; and it is no longer a mere project, as a trial has recently been made successfully by the Société des Forges et Chantiers at Havre on the tug-boat *Adour* No. 3, built two months ago for the "Chambre de Commerce, of Bayonne." In this boat steam was produced by two boilers of quite different systems, one boiler being of the common return-tube type, and the other a water-tube boiler of the Normand system.

This tug has independent paddle-wheels with fixed blades; the wheels may be connected or disconnected under way.

The main dimensions are:—

	Ft.	In.
Length, between perpendiculars..	118	1
Breadth .. .. .	23	7½
Depth, moulded .. .. .	18	1½

\* Read at the Thirty-sixth Session of the Institution of Naval Architects, Paris, June 12th.

Draught on trial .. .. .	8 0 $\frac{1}{2}$
Power of the engines (about) .. .. .	700 H.P.
Weight on board { Coal in bunkers, 16 tons } .. .. .	18 to..s.
{ Crew, tow-rope, &c., 2 tons }	

The conditions of trial were:—Speed of 11 knots during six hours, the coal consumption not to exceed 2·1 lbs. per H.P. per hour. The getting up steam to be made within 30 minutes; of course it is most important for a tug-boat to get steam up as quickly as possible, especially when employed on salvage service.

This last condition has compelled us to put on board two different kinds of boilers; one of the Normand type, and one return-tube boiler of the ordinary type. We would rather have coupled two Normand boilers had not the owners asked that at least one of the two should be of the usual type, as they feared for the results of two water-tube boilers.

The principal dimensions of the engines and boilers are:—

	Pressure .. .. .	114 lbs. per sq. in.
Normand boiler.	Grate surface .. .. .	34·70 sq. ft.
	Heating surface .. .. .	1,560·20 sq. ft.
	Steam space .. .. .	32·82 cub. ft.
	Water volume .. .. .	82·58 cub. ft.
Return-tube boiler	Grate surface .. .. .	38·73 sq. ft.
	Heating surface .. .. .	1,232·55 sq. ft.
	Steam space .. .. .	176·45 cub. ft.
	Water volume .. .. .	345·13 cub. ft.
	Number of engines .. .. .	2
	Type of ditto:—Compound, two cylinders, inclined, the two engines being coupled together in the centre of the shafting.	

	Ft. In.
Diameter of high-pressure cylinders ..	1 10 $\frac{13}{16}$
Diameter of low-pressure cylinders ..	3 3 $\frac{3}{4}$
Stroke .. .. .	8 7 $\frac{1}{16}$

The wheels with fixed blades have an external diameter of 16 ft. 1 $\frac{1}{2}$  in.

The general arrangement is a very disadvantageous one for the working together of two different boilers on the same set of engines. The whole is contained, as usual, in three different compartments divided by two water-tight bulkheads.

The boiler of the Normand type is placed in the forward compartment, with its funnel forward and stokehold aft; the engines are in the centre compartment, and the after compartment contains the return-tube boiler, with its stokehold placed forward. No special arrangement has been made for the steam and feed pipes, one single steam pipe making the communication between the two boilers, through the engine-room, with a branch to each engine. In the same way, the feed pipe is common to both boilers, and communicates with two independent feed pumps placed on the side of the engine-room, each one of which is sufficient to feed the two boilers. A single pump was working during the trials.

During the preliminary, as well as the official trials, the working of the boilers gave no trouble, the pressure remaining steady; no difficulty was found with the feed, whether the engines were worked connected or disconnected, the one ahead, the other astern, the one at rest and the other running, just as the owners (who wanted to be quite sure about the general working conditions of a tug boat) gave their orders.

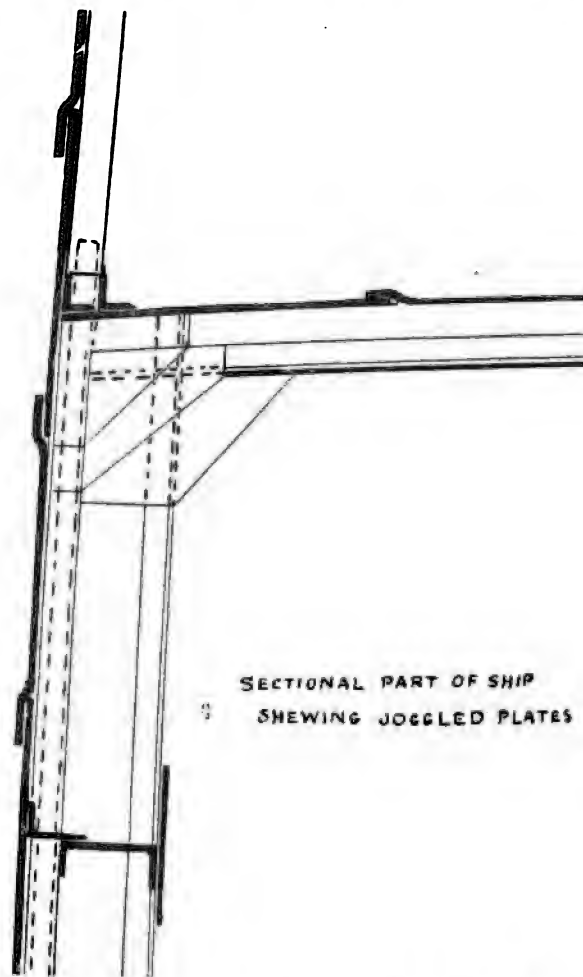
The time for getting up steam with the Normand boiler was, in the two trials, from 22 to 23 minutes. At the official trial for coal consumption, which lasted for six hours, the mean speed being 11 knots and the mean power 673 H.P., with 29·5 revolutions per minute, the consumption of coal was 1·81 lbs. per H.P. per hour, the fuel used having been briquettes d'Anzin.

The engines, running at full speed, indicated 731 H.P. The quantity of coal burnt in each boiler was pretty nearly the same on each trial.

These results seemed to me worthy of notice, as they prove that, it is easy to combine on board a ship water-tube boilers of the Normand system, or any other analogous type, with return-tube boilers, as it was carried out in the most difficult conditions—that is to say, coupled and in separate stokeholds. Therefore, the dislike which certain owners profess towards them, on account of the fear they entertain of difficulties in working, is unjustified. I need not otherwise enumerate here all the advantages which those new boilers present, as compared with the return-tube boilers.

## IMPROVED METHOD OF FITTING SHIP PLATING.

PAINSTAKING and ingenious shipbuilders are constantly seeking to effect a further saving in weight of material and cost of labour of ships' hulls, while at the same time maintaining requisite structural strength. A system of plating ships which has for some considerable time been patented by Messrs. Bell & Rooliffe—whose patent sections in the way of bulwark, rails, &c., are extensively used—possesses undoubted advantages from these points of view and is now being adopted in daily practice by Messrs. Doxford & Sons, of Pallion Yard, Sunderland.



The principal aim of the system in question is the dispensing with "packing" or lining pieces throughout the hull structure, and at the same time securing an equally neat, tight, and strong job. Packing, it is well recognised, does not contribute to strength, but is merely an addition to weight—40 or 50 tons and even more in some large ships—the absence of which is very much better than its presence, provided the structural elements proper can be manipulated so as to bear closely "metal-to-metal."

The new system dispenses with all such filling, the improvement being effected by "joggling" or kinking the edges of each outside strake of plating over the edges of the adjoining inner strakes; every strake thereby being brought right home to the frames or beams without any intervening liners. From the sectional part of a ship illustrated in the accompanying sketch the arrangement will be better understood. The system is applicable of course, not only to shell plating, but to deck plating, tank-top plating, and indeed wherever the joggling of plates to meet other plates or bars, "metal-to-metal" dispenses with the burdensome filling pieces.

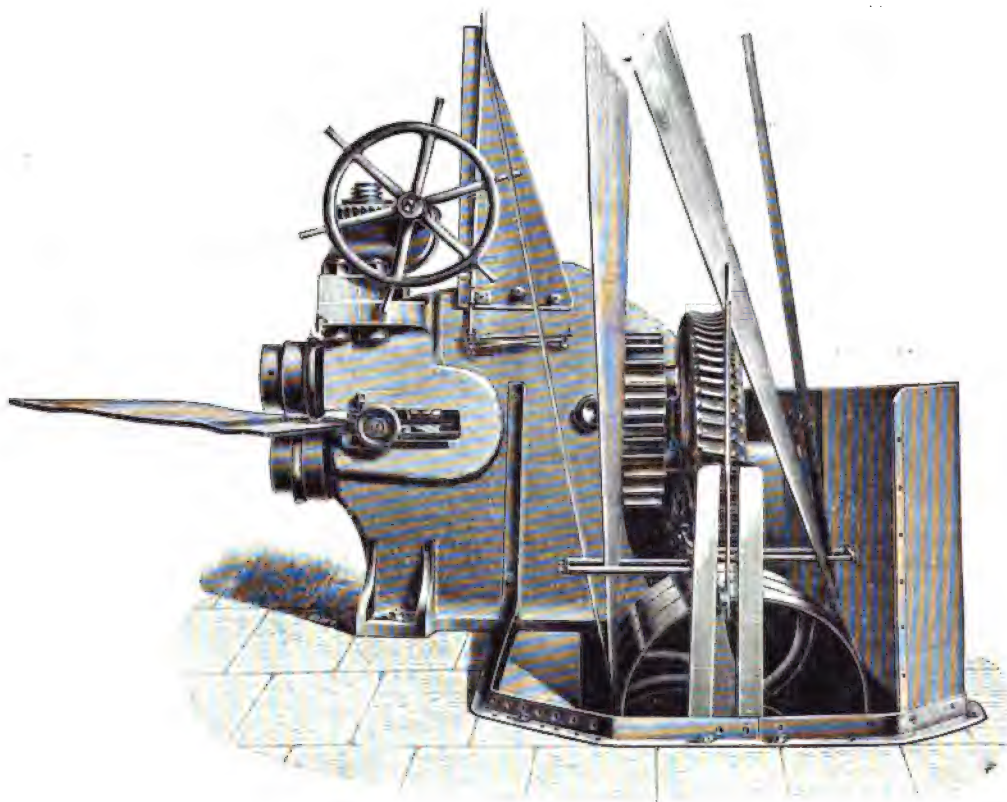


For the joggling of the plate edges Messrs. Doxford have invented and had made a special machine-tool, two of which are now in operation in their yard, and expeditiously and effectively accomplishing the work required. From our illustrations of this machine-tool on this page it will be seen that the edge of the plates forming the outer strakes is run through between rollers, working in a gap of the frame of the machine, which rollers are so shaped and adjusted relatively to each other as to form the joggle or indent required as the plate passes through between.

The system has already been applied to several vessels, not partially only but from keel to gunwale, and from end to end, and is being adopted in all the patent "Turret" vessels now being plentifully laid down by Messrs. Doxford for a growing *clientele* of customers. As regards the way in which it affects or does not affect the general appearance of vessels, an idea of this may be gained from the view taken from a photo of one of the vessels fitted given in our Supplement.

allowed. The work of fitting, tapering, templetting, and punching the packing pieces and liners is in itself no small item, and dispensing with it means, in the case of large vessels, a saving of some consequence, especially in these days of minute economies.

Falling to be deducted from the total saving, of course, is the cost of joggling the plates by the special machine, this being about one-tenth of the whole. The gain in carrying capability is not quite equivalent to the 38 tons of material saved, because from this figure must be deducted some 10 tons of loss in displacement, due to the finer form of the hull caused by the inward indent given to the outer or raised strakes of plating by this system. The perpetual gain, however, of some 28 tons carrying power secured by this system in a vessel of 2,700 tons register over a vessel of the same size built on the ordinary principle is a consideration, which should secure for the enterprising firm who have introduced this improvement, substantial benefit, either in the way of



A few particulars of the estimated saving effected by this new departure in regard to labour and weight of material, and of the resulting gain in deadweight carrying capability should be of interest to shipbuilders and shipowners. One of the vessels to which the system has been applied is of 2,700 tons register, the total weight of metal worked into her structure being about 1,800 tons. As compared with a similar vessel in which this joggling system has no place, there is a saving in weight of hull of about 38 tons or a nett gain in material saved of 3 per cent. Three-fourths of this total is made up of the weight of packing and liners dispensed with, and close on one-fourth of it by the weight of cement saved, owing to the outer strake of plating on bottom being brought up close to the frames.

As regards labour the gain is considerable, and may be expected to become more so as the workmen become more familiar with the process of joggling. The work of rivetting through two ply of material is obviously more satisfactory and less difficult than through three ply, as is the case when packing is present. The workmen of course have to concede the obvious fact as to the easier work of rivetting, and a reduction in the rates for rivetted work is in consequence

increasing their margin of profit on contracts or in enabling them to give shipowners a more favourable quotation for deadweight carrying steamers.

### LAUNCH AT HAIPHONG.

ON April 29th, Messrs. Marty & D'Abbadie launched from their shipbuilding yard, on the Cua Cam, a stern wheel steamer, specially constructed for their subsidised line on the Red River between Hanoi, the capital of Tonkin, and Laokay on the frontier of Yunnan.

The *Yenbay* is the seventh stern wheel steamer built in the Ateliers des Correspondances Fluviales at Haiphong from the designs of Mr. W. C. Jack, the engineer-in-chief of the company.



The dimensions are as follows:—115 ft. over all; beam, 20 ft. 6 in., and 23 ft. outside guards; depth, 4 ft. 6 in.; and draft of water, 22 in.

The engines are of the compound surface-condensing type and are furnished with several innovations calculated to improve their working in the Red River, where during the summer months the water is of the consistence of pea soup.

The cylinders are 12 in. and 20 in. by 48 in. stroke.

The boiler is of the Admiralty gunboat type arranged to burn firewood.

The same firm have lately completed a light draft stern-wheel gunboat to the order of the French government for the Mekong, which we illustrate on

## THE INSTITUTION OF NAVAL ARCHITECTS.

THE summer meeting of the Institution of Naval Architects was held this year in Paris, and commenced officially on Tuesday, 11th June. However, it would perhaps be more correct to say that it commenced on the Monday evening previous, when a very brilliant reception was held by Monsieur and Madame Bertin at their house, 8, Rue Garancière, a very vivid remembrance of which will, we feel sure, long remain in the minds of those whose privilege it was to be present. The business meetings of the Institution were held in the magnificent new amphitheatre of the Sorbonne, the use of which had been very kindly granted by the Rector of the University of Paris, Monsieur Octave Grévard.

The members of the Institution, on their arrival at the grand



this page. This boat was entirely built and put together in Haiphong and afterwards dismantled and forwarded in pieces, the heaviest of which did not exceed 5 cwt., by way of Saigon up the Mekong river and erected on the Island of Khone.

Her dimensions are—Length, 25 metres; beam, 4 metres; depth of hold, 1 metre; draft, 45 centimetres.

They have now on hand a sister ship to the *Yenbay* a fast twin-screw launch to the order of the government for the postal service, and a powerful suction dredger destined for the deepening of the canals and shallows of the Tonkin Delta.

**Torpedo-boat Destroyers.**—We understand Messrs. Yarrow & Co., of Poplar, have refused the order which the British Admiralty offered them for three 30 knot torpedo-boat destroyers.

entrance to the Sorbonne, in the Rue des Ecoles, were received with great warmth and cordiality by the members of the Reception Committee, headed by its President (Admiral Charles Duperré). Shortly after 10 o'clock the whole of the company assembled in the new amphitheatre, when Admiral Duperré took the chair, being supported by Lord Brassey (the President) and the members of the Council of the Institution, and also by the members of the Reception Committee. Among those present were Sir Nathaniel Barnaby, Sir William White, K.C.B., Mr. J. I. Thornycroft, Mr. B. Martell, Professor F. Elgar, LL.D., Mr. A. F. Yarrow, Mr. F. C. Marshall, Mr. A. E. Seaton, Mr. A. Denny, Mr. D. Dunlop, Mr. J. Corry, Admiral Fitzgerald, Admiral Bowden Smith, Capt. Eardley Wilmot, R.N., Mr. Privy Councillor Dietrich (Chief Constructor German Navy), M. Lecoite (Chief Constructor Belgium Navy), Mr. James Hamilton, M. Kasy (a retired Russian naval officer), M. Artsakouloff (Director of Naval Construction at the Arsenal of Sebastopol), Mr. G. W. Manuel (P. & O. Co.), Mr. C. S. Dunsatoy (Union Steamship Co.), Mr. Archibald Thomson, Mr. George Holmes (the secretary), &c. &c. The French Reception Committee

consisted of the following, and with very few exceptions they were all present:—

Honorary President—Vice-Admiral Besnard (Minister of Marine).

President—Vice-Admiral Charles Duperré.

Representatives of the Ministry of Marine—Vice-Admiral Charles Duperré, Rear-Admiral Dieulouard, M. E. Bertin, M. le Vicomte Clauzel, M. Lemaire.

French Naval Officers—Vice-Admiral Gervais, Vice-Admiral Cavalier de Cuverville.

Representatives of the Municipal Council of Paris—M. Boussole, President; M. Maury, Syndic.

Representatives of the Chamber of Commerce of Paris—M. Delaunay-Belleville, President; M. Lourdelet, Secrétaire adjoint. The Rector of the University of Paris—M. Octave Grévard.

The Director of the Conservatoire des Arts et des Métiers—Colonel Leussadat.

Representatives of the French Institution of Naval Architects—(Association Technique Maritime)—M. de Bussy (Membre de l'Institut), President; M. Augustin Normand.

Representatives of the Society of Civil Engineers of France—M. Appert, President; M. Fleury, Vice-President; M. Canet, Member of the Committee; M. le Marquis de Chasseloup-Laubat; M. le Comte de Dax, General Secretary.

Representatives of the Society for the Encouragement of National Industry—M. Mascart (Membre de l'Institut), President; M. Collignon (Inspecteur-Général des Ponts et des Chaussées), Vice-President; M. A. Carnot (Membre de l'Institut); M. Richard, General Secretary.

Representatives of the Union of Yachts—Rear-Admiral Baron Lage, President; M. de Boulogne, M. Scholcher, Comte de Guebriant, M. Maurice Loir, M. Desprez, Comte de Montaigne.

Representatives of the Yacht Club of France—Vice-Admiral Bonie, President; Rear-Admiral Coulombeau.

Representative of the Western Railway Company of France—Compagnie des Chemins de Fer de l'Ouest—M. Delarbre, President of the Council of Administration.

Representatives of Le Creusot—M. Schneider, M. Eugene Schneider, M. Fliche.

Representatives of the Société des Forges et Chantiers de la Méditerranée—M. Jouet-Pastre, President; M. Widmann, Director-General.

Representatives of the Société des Chantiers et Ateliers de la Loire—M. Fould, President; M. Chandoye, Director-General.

Representatives of the Société des Chantiers et Ateliers de la Gironde—M. le Comte de Bondy, President; M. Lebelin de Dionne, Director-General.

Representatives of the Compagnie des Messageries Maritimes—M. Girette, President; M. Lecat, Director-General.

Representatives of the Compagnie Générale Transatlantique—M. Persire, President; M. Daynard, Engineer-in-Chief.

Representatives of the Chargeurs Réunis—M. Fould, President; M. Duprat, Director.

The following French Members of the Institution of Naval Architects not included in the above—M. Berrier-Fontaine, Director of Naval Construction, Toulon; Captain le Clerc, French Naval Attaché in London; M. Du Buit, M. Ferrand, M. Lannes, M. Piaud, M. Lagane, M. Le Doux, and M. P. Sigaudy.

The Executive Committee—M. Bertin, Chairman; M. le Vicomte Clauzel, M. le Marquis de Chasseloup-Laubat, M. le Comte de Dax, M. Maurice Loir, and M. le Comte de Guebriant, and M. Richard.

Vice-Admiral Charles Duperré, President of the Reception Committee, in opening the proceedings, delivered an address in French, of which the following is a translation:—Gentlemen,—The Reception Committee, including representatives of the Government of the Republic, the national Navy, the French University, the Chamber of Commerce, and of scientific institutions, as also of industrial companies and establishments, extends to you all a hearty welcome. The authorities of your Institution have had the happy idea of choosing Paris as the place of meeting for your session of 1895, and you now leave British soil for the first time. We thank you for the choice thus made, and hope that the mingling of English and French shipping specialists, which is now about to take place, will have most valuable results. Your initiative in coming to see us and make yourselves acquainted with us, and letting us see and become acquainted with you, is one of those events that are calculated to at once cement the individual sympathies and friendships of nations. With people animated by the same

humanitarian spirit, the same ardour in the pursuit of what is good and noble, to know and appreciate each other is to like one another. We beg to assure you that we are delighted to have you amongst us, and we ask you to continue your labours under the aegis of this Sorbonne, which for six centuries has been an arena for oratorical tournaments and intellectual strife. This Institution will now record as a memorable fact in its history that it has been the meeting place of the first congress ever held abroad by the great Institution of Naval Architects.

M. Bandin, representing the Paris Municipal Council, next spoke, also in French, to the following effect:—My Lord and Gentlemen,—As representing the City of Paris, I venture to add a few words to the cordial expression of welcome that has just been addressed to you by Vice-Admiral Duperré. The city of Paris, gentlemen, claims to welcome you on its own special behalf. We feel extremely flattered in that you have chosen the Parisian city as your rendezvous on this occasion; we are very happy to number you amongst our guests, belonging as you do to so celebrated and powerful an institution; and we are specially proud to have as our guests Lord Brassey, Sir Nathaniel Barnaby, and Sir William White, whose labours have shed such glory upon your Institution as a whole, and whose presence here is particularly gratifying to us. We hope, gentlemen, that your sojourn in this city will remain graven in your memory, not only by reason of the utility of the labours connected with this congress, but also as a recognition of Parisian hospitality, which the city desires should be of the most cordial character, and an evidence of the friendly feeling it entertains towards the Institution of Naval Architects. We hope that something of its beauty, its heart and *esprit* may enter into you and exercise a charm upon you. Gentlemen, the Municipal Council of Paris invites you to a reception on Friday next, when we shall be truly delighted to have you with us, to fête you, and to celebrate that union which Vice-Admiral Duperré has described in such elevated terms as the "union of the two nations." We feel deeply sensible of the honour now conferred upon France, and in welcoming the Institution of Naval Architects we express a fervent hope that it may have as full a meed of prosperity in the present and the future as in the past.

The President (the Right Hon. Lord Brassey, K.C.B.) then delivered his opening address in French, the following being an English version:—Gentlemen,—If in order to do homage to the French nation I endeavour to read my reply in the French language, I feel sure you will not be too exacting in the matter of bad pronunciation nor criticise me too harshly. It now becomes my duty to reply on behalf of the Institution of Naval Architects to the speeches which have been delivered. Our thanks are due to all our kind hosts, especially to the President of the French Republic, who, when Minister of Marine, was the first to take up and encourage the idea of the proposed visit of our Institution to Paris; to Vice-Admiral Besnard, the present Minister of Marine, who is the Honorary President of the Reception Committee; to Vice-Admiral Charles Duperré, President, and the members of the Reception Committee; to M. Bertin, Chairman, and those associated with him on the Executive Committee; and to M. Octave Grévard, Rector of the University of Paris, by whose kind permission we are assembled to-day in the amphitheatre of the Sorbonne. Our Institution has indeed been highly honoured. Your splendid navy, your naval architects, engineers, shipbuilders, and shipowners, your men of science, and your yachtsmen, are represented on the Reception Committee. We fully appreciate the immense trouble you have taken to secure complete success for the first meeting our Institution has held in a foreign country. It was fitting that that meeting should be held in France. Our French colleagues, M. de Bussy, Berrier Fontaine, Bertin, Normand, and Daynard, have been among the most regular attendants at our meetings and the ablest speakers at our discussions.

Having discharged, though most imperfectly, the agreeable duty of expressing our thanks, I proceed to offer a few general observations. And first, I desire to say that we are here not only to exchange international courtesies—this is indeed a most important duty, for which every suitable opportunity should be eagerly seized—but we are here also to gain instruction. You have taught us much, and will always have many things to teach us. I am reminded, in an able memorandum prepared by Mr. Martell, principal surveyor of Lloyd's, that it was under the famous administration of Colbert that mathematical science was first successfully applied to naval construction. It was long before the same judicious blending of theory and practice was adopted in our own country. For a considerable period French

ships were markedly superior in model to those of British construction. Descending to later times, I am reminded by our colleague, Sir Nathaniel Barnaby, that your *Napoleon* was the first steam line-of-battle ship seen in any navy. The first ironclad ship ever built was the *Tonnante*, launched at Brest in March, 1855. The first seagoing ironclad was the *Gloire*, launched in 1858. These three ships, each being the pioneer of a new type, owed their origin to the genius of M. Dupuy de Lôme.

If from design we turn to the materials used in construction, the first step in the substitution of steel for iron in armour plates was made in France by M. Henri Schneider. He has produced plates of the unrivalled thickness of 22 in. It is also to France, to your contractors at L'Orient and Brest, that the credit belongs of having been the first to use the modern soft steel plating for building the hulls of ships. As in the building of the hulls, so in the manufacture of machinery and boilers we are greatly indebted to French inventors. For our last cruisers—ships of dimensions never before approached, which we are naturally anxious to make in all respects as perfect as possible—we have come to France for that primary source of vitality in a steamship, I mean the boilers. They will be of a new type, the invention of one of our kind hosts in Paris, M. Delaunay Belleville.

If we turn from the construction of ships and machinery to the literature of the subject, the contributions of French authors have ever been held in the highest esteem in England. Bouguer, whose "*Traité des Navires*" was published in 1746, was the first to make a theoretical investigation of the stability of floating bodies. The true theory of the rolling of ships in still water was first established by Bernoulli, almost a contemporary of Bouguer. The subject of stability was again taken up by M. Dupuis, who published in 1814 a series of original and brilliant geometric theorems, still used, as I learn from Mr. Martell, with advantage by English writers. Coming to more recent times, we owe to M. Beech our knowledge of the laws of wave motion and resistance, as described in his "*Cours de Mécanique*," published in 1852. The most recent investigations on the same subject, and they are of great value, are those of MM. Bertin, Antoine, Duhil de Benaye, and Riebec. M. Daynard's paper on "Stability," read in 1884, is one of the most important papers which have been published in the thirty-five volumes of our proceedings.

It is almost time that I should conclude a speech which, being delivered in a foreign accent, must be painful to French ears; but before I sit down I should like to say a few words on a great maritime enterprise with which, for a time, I was connected as a director, and in which France and England have worked together for the beneficent purposes of commerce and civilisation. I allude to the Suez Canal. The construction of the Canal was wholly your work. Against every opposition—even, I regret to say, that of England—the work was achieved, under the inspiration derived from a great Frenchman, whom you have recently lost. In making the Suez Canal a success, England can certainly claim no more merit than belongs to the labourer of the eleventh hour. Yet we have played, though a humble, yet a useful part. We have helped to make the undertaking pay. We have been by far the largest contributors to the revenue of the company. I regard the co-operation of France and England in the Suez Canal as a happy augury for the ultimate friendly solution of those political problems, created by the Suez Canal itself, with which we have here happily nothing to do. The results achieved by the combined enterprise of the two nations indicate and illustrate the lines of peaceful progress by which, in friendly co-operation, the two countries have it in their power to do so much for the advantage of mankind. Believe me, it is the highest ambition of the members of the Institution of Naval Architects to find themselves associated in the enterprises of peace with their French colleagues. We come here to-day warm friends and admirers of that gifted French nation, to which, in every branch of human thought and effort in political ideas, in culture, in literature, in art, in industry, invention and practice, the world owes so much. It gives me peculiar pleasure to be here to-day in the position which I have the honour to fill. I spent a great part of my childhood in this country. My father came here by your invitation as the pioneer contractor, to organise works and workmen in the construction of those great railways which, in an incredibly short time, you learned to construct for yourselves. I remember with gratitude the fair and liberal spirit with which my father, a stranger in your midst, was treated by his French employers. Once more, in the name of the Institution of Naval

Architects, I return their cordial acknowledgments for your generous and friendly welcome.

The President then assumed the chair and the business of the summer meeting was proceeded with. The first paper was contributed by Monsieur Emile Bertin, Directeur des Constructions Navales and Directeur de l'Ecole d'Application Maritime, Member, on "The Amplitude of Rolling on a Non-synchronous Wave." The next paper read was by Sir William White, K.C.B., LL.D., F.R.S., Director of Naval Construction and Assistant Controller of the Navy, Vice-President, on "Wood and Copper Sheathing for Steel Ships." In the discussion on this paper reference was made to the difficulties under which the author laboured in the preparation of the paper owing to indisposition, and feelings of appreciation at the attendance of the author at the meeting were expressed, and it was hoped that his complete convalescence would shortly be accomplished.

The third paper read was by Archibald Denny, Esq., Member of Council, on "The M.G. Meter," which described an instrument, by means of which the mass of a ship could himself obtain the metacentric height of his vessel. We have in the present issue dealt with these three papers in our Editorial Notes. The meeting was adjourned for the day in order to allow members to visit objects of interest in Paris.

In the evening the annual summer dinner of the Institution was held at the Hotel Continental, when the Right Hon. Lord Brassey, K.C.B., presided over a very large and distinguished company. After the dinner the Marquis of Dufferin and Ava proposed the health of Monsieur Faure, the President of the Republic; Monsieur Brouard proposed the health of Her Majesty the Queen of Great Britain, Empress of India.

Lord Brassey then proposed a toast in honour of the "French Navy," which was responded to by Vice-Admiral Duperré.

The toast of "Prosperity to the City of Paris" was proposed by Sir Nathaniel Barnaby, with which was coupled the names of Monsieur Rousseau, who responded to the same.

Sir William White proposed the toast of "Our Guests," which was responded to by Monsieur Beinaime.

Mr. B. Martell proposed the toast of "The Trade and Commerce of France" in a lengthy speech, which was responded to by Monsieur Delaunay Belleville.

Monsieur Appert, the President of the Society of Civil Engineers of France, proposed the toast of "Prosperity to the Institution of Naval Architects," which was responded to by Lord Brassey.

On the second day, Wednesday, 12th June, M. Bertin showed upon a screen a series of most interesting instantaneous photographs, analysing a simple movement of pitching and rolling of several French warships. At the conclusion of his exhibition M. Bertin was heartily thanked by Lord Brassey on behalf of the company.

The following papers were then discussed:—

"On the Utility of making the Calculation of the total external Volume of Ships, and of drawing out the complete Scale of Solidity, from the triple Point of View of Tonnage Laws, Stability and Loadline." By Monsieur V. Daynard, Engineer-in-Chief of the Compagnie Générale Transatlantique, Member. "On light Scantling Steamers." By B. Martell, Esq., Chief Surveyor, Lloyd's Registry of Shipping, Vice-President. "On Coupling Boilers of different Systems." By Monsieur Pierre Sigaudy, Engineer-in-Chief of the Forges et Chantiers de la Méditerranée, Member.

Messrs. Daynard's and Pierre Sigaudy's papers we publish in this issue, and that by Mr. Martell in our August issue.

In the afternoon, after luncheon, the members of the Institution were conveyed from the Sorbonne in special carriages provided by the Reception Committee to the laboratory of the famous chemist, M. Raoul Pictet, whose experiments on the artificial production of intense cold are so well known. The visitors were shown methods and apparatus for the production of temperatures 210 degrees below zero centigrade, and also appliances for the utilisation of cold in industry science, and therapeutics, and the employment of sulphurous anhydride, of ethylene, and of liquefied atmospheric air. The party were afforded an opportunity of testing the practical effects of M. Pictet's methods in one particular. They were invited to taste some brandy of recent manufacture, which was stated to have acquired all the qualities of a liquor of great age, these qualities having been imparted as the result of special treatment by applications of extreme cold. M. Pictet's premises are situated in the Rue Championnet, just within the line of fortifications,

and to a large part of the company the long drive through Paris was not the least interesting feature of this portion of the day's proceedings.

The next item in the programme was an inspection of the underground system of drainage in Paris. The members returned to the carriages that had conveyed them to M. Pictet's laboratory, and which were divided into two groups. One of these groups proceeded to the Place du Chatelet and the other to the Place de la Madeleine. From these two points the visitors descended into the underground trains, and the Reception Committee had made adequate provision for calling attention to the many notable features of these extensive works.

In the evening Admiral Besnard, the Minister of Marine, gave a grand reception and ball in honour of the visit of the Institution, in the historic saloons of the Ministry of Marine, in the Place de la Concorde. Every member of the Institution attending the summer meeting received an invitation, including one for a lady, and the Minister had also invited a large company of French scientists, naval officers, and others. Gentlemen possessing orders and decorations were requested to wear them, and while many of the English visitors wore uniforms, the regulation for ladies was "full ball toilettes." The handsomely-furnished saloons had been profusely decorated with flowers, &c., and most of the walls were adorned by costly tapestries. The company commenced to arrive at about 10 o'clock, and each guest was greeted by Admiral and Madame Besnard with unmistakable warmth and cordiality. The reception continued until nearly midnight, when the rooms presented a striking spectacle. The apartments were illuminated throughout by the electric light, and the numerous uniforms, the elegant dresses of the ladies, the great floral display, and a variety of other features combined to furnish a scene which is not likely to be soon forgotten by those who had the good fortune to be favoured with invitations. The British Ambassador to France (the Marquis of Dufferin and Ava) was present during a portion of the evening, and the members and associates of the Institution who also attended included the Right Hon. Lord Brassey, K.C.B. (the President), Sir Nathaniel Barnaby, Sir William White, K.C.B., Mr. J. I. Thornycroft, Mr. B. Martell, Professor F. Elgar, LL.D., Mr. A. F. Yarrow, Mr. F. C. Marshall, Mr. A. E. Seaton, Mr. A. Denny, Mr. D. Dunlop, Mr. J. Corry, Admiral Fitzgerald, Admiral Bowden-Smith, Capt. Eardley Wilmot, R.N., Mr. Privy Councillor Dietrich (Chief Constructor German Navy), M. Lecoq (Chief Constructor Belgium Navy), Mr. James Hamilton, M. Kazy (a retired Russian naval officer), M. Artsouloff (Director of Naval Construction at the Arsenal of Sebastopol), Mr. G. W. Manuel (P. & O. Co.), Mr. G. S. Dusauroy (Union Steamship Co.), Mr. W. G. Neal, Mr. Archibald Thomson, Mr. John Gravell, Mr. G. A. Laws (Shipping Federation), Captain T. V. S. Angier (Vice-President of the Chamber of Shipping), Mr. J. D. Churchill, Mr. S. J. Beecher, Mr. G. T. Harper, Mr. C. H. Rugg, &c., with Mr. George Holmes (secretary).

In the course of the day many members of the Institution visited other places of interest in and around Paris, special facilities for such visits having been secured by the Reception Committee.

On the third day, Thursday, 13th, Mr. Martell proposed a resolution making certain alterations in the rules of the society, and said the object of these alterations was to allow the council a little more scope in conferring the honorary membership upon distinguished persons and others.

Mr. Marshall seconded the motion, which was at once agreed to, and

Lord Brassey said: The outcome of all these formalities is that the Prince of Wales and the Duke of York have joined the Institution as honorary members.

The following papers were then read and discussed:—"On the Cost of Warships," by Francis Elgar, Esq., LL.D., F.R.S.E., Vice-President; "On some necessary Conditions for Resisting intense Firing in Water-tube Boilers," by Monsieur Augustin Normand, member; "On the Niclausse Boiler," by Mark Robinson, Esq., Member.

We have dealt with Dr. Elgar's paper in our Editorial Notes in this issue, also, at the same time, we publish Monsieur Normand's paper, and in our August issue we shall publish Mr. Mark Robinson's paper.

On the conclusion of the formal business, Lord Brassey then said that the last of the papers on the programme having been read and discussed, he had a duty to perform, and he was sure they would all recognize that it was not in any sense a formal

duty, but a duty prompted by the warmest feelings of grateful hearts. He had to propose a hearty vote of thanks to the Reception Committee, which had provided such a happy time for them in Paris. He could assure the members of that Committee that what they had done for the Institution would be warmly appreciated, not only by the members of the Institution, but also, he would venture to say, by the whole British nation. The present meeting would be long remembered as one of those occasions which really and effectively drew two great nations nearer to one another. In the name of the Institution, he now tendered their most hearty thanks to the Reception Committee, and their grateful acknowledgments were also due to other societies and individuals. Their special thanks were due to the Minister of Marine, to the Municipality of Paris, to the Paris Chamber of Commerce, to the authorities of the Sorbonne, and to M. Bertin (the chairman of the Executive Committee), who entertained them so hospitably on Monday evening. The invitation to the Institution of Naval Architects to hold their summer meeting in Paris came originally from four great bodies, viz., the French Institution of Naval Architects, the Society of Civil Engineers of France, the Society for the Encouragement of National Industry, and the Union of Yachts. To all these and other bodies they were indeed indebted for the hearty welcome that had been extended to the Institution, and with a very full heart he proposed that their sincerest thanks be offered to the whole of the members of the Reception Committee.

Sir William White seconded the proposition, and in very happy and graceful terms made special reference to the fact that ladies had been included in the invitation issued by the Reception Committee.

The motion was put to the meeting and carried with acclamation.

Admiral Duperré, the chairman of the Reception Committee, having briefly acknowledged the vote,

M. Bertin, the chairman of the Executive Committee, said: My Lord, Ladies, and Gentlemen,—I hope you will excuse my addressing you in English. It was not my wish to do so, but all my friends insisted upon my speaking in your own language. All of us members of the committee, whether we are representatives of the Government, of the large corporations, of the scientific institutions, or of the large industrial firms who have co-operated in the agreeable task of preparing the reception for your Institution of Naval Architects, are extremely grateful for the kind words which Lord Brassey has spoken. We think that his expression of gratitude is far in excess of any trouble which we have taken on your behalf. We can say so with all the more confidence, because if these meetings have been an undeniable success, it is due, in a great measure, to Lord Brassey himself, for the principal success has been that of the speeches which he has himself delivered, and for the *esprit* by which they have been inspired, which instantly gained the hearts of all who were present. Thus, we have, in a large measure, to return to Lord Brassey the thanks which he has been good enough to bestow on us. We should like to add that if any shadow has crossed our path during these proceedings, it has been due to the absence of Lady Brassey, who has been detained in England by a painful duty, and by anxieties which, we believe, have now been happily dissipated; but their existence has caused us to value still more highly the presence of Lord Brassey himself. Next to the speeches of Lord Brassey, we attribute the success of the meetings to the speakers who have come here to treat subjects of the greatest interest with consummate ability, combined with the oratorical and debating talent which are due to the habits of public life in England. It is not necessary for me to draw a picture of the comparative merits, or the individual value of the services which have been rendered to ship construction and navigation by Dr. Elgar, Mr. Denny, and Mr. Martell—who always stands in the breach for Lloyd's Registry—or by those who have treated the delicate question of the different systems of water-tube boilers. But we have to thank Sir William White in a double sense, first, for the exceptional interest of his work on the sheathing of the hulls of steamships, and, secondly, for the energy, of which he has given a proof, by writing his paper during a severe illness and even in braving the fatigues of these meetings at a moment when he was most in need of rest. Gentlemen, we appreciate, in a high degree, the fortunate consequences which result from the meetings of technical men, and of the free discussions which have been your custom for so long a period. We do not esteem less highly the results of the professional confraternity and good-fellowship, which create in

scientific matters a common country. Finally, I do not forget the custom so generally followed in England of remembering our absent friends, and I will conclude with an expression of regret at the absence of Sir Edward Reed, and with our best wishes for his recovery from the illness which has prevented him being present at these meetings.

As this was the last meeting which Lord Brassey would attend in his capacity as President, an address had been prepared, which was presented by Sir Nathaniel Barnaby, and which contained in appropriate terms the regret of all at the loss of Lord Brassey's services.

Lord Brassey next proposed a vote of thanks to Mr. Holmes, the secretary of the Institution. It was seconded by Mr. Martell, and carried with very hearty acclamation. The members then separated.

On Thursday afternoon a special visit was made to the Eiffel Tower, which was ascended, after which a visit was paid to the Anciens Etablissements Cail. It was said on the programme that there are manufactured here first-class torpedo-boats, marine boilers, machines for propelling torpedoes, marine gun-carriages, marine, coast, field, and mountain artillery, electrical machinery, locomotives, sugar-making machinery, and tramway engines; but time did not allow of the inspection of such a variety of devices set forth.

From the Cail Works members proceeded to the adjoining establishment of Messrs. Sautter et Harlé.

On the evening of Thursday, the 13th inst., M. Delannay-Belleville, the president, and members of the Chamber of Commerce, Paris, gave a reception at the Hotel Continental. All was done that could be to make the evening pleasant, and again another brilliant success was scored by the hospitable Parisians.

Friday, the 14th inst., was devoted entirely to excursions, and to an evening entertainment. The first business was a visit to the well-known Belleville boiler factory at St. Denis. Here members were shown Belleville boilers in all stages of construction, and the methods by which the parts were prepared. The process of erecting the boilers was watched with special interest, and when seen proved an extremely simple operation, the lengths of pipe being screwed into the headers as the elements were built up, by right and left handed threads. Having been shown all that was to be seen, a return was made to Paris, where an interval was allowed for lunch. In the afternoon another boiler works was visited, viz., those of the Niclausse Co. in the Rue des Ardennes. Here, again, members were shown all through the works, the various methods of constructing this novel and ingenious form of boiler being seen. One of the chief points of interest was the removal of a tube from a boiler under pressure, and the fixing of a fresh tube in its place. The boiler was not under steam, but subjected to hydrostatic pressure. The time occupied in letting off pressure, removing the tube, putting another into position, and again raising pressure, was  $7\frac{1}{2}$  minutes. It should be stated, however, that the element operated upon stood alone in the open. How much difference it would make if the operation took place actually on shipboard we do not know, but probably it would not be great. It must also be remembered that the boiler was cold. The Niclausse boiler is one of great interest and considerable promise.

On the evening of Friday there was another reception, given by the President and members of the Municipal Council of Paris. This was held at the magnificent rooms of the Hôtel de Ville.

Saturday, June 16th, was the last day of the meeting, and was mainly occupied by a visit to St. Germain. Members were conveyed down the Seine by steamers, starting from the Quai de la Conférence. Fortunately, the weather, which had been wet on the previous afternoon, and up to seven o'clock on the morning of Saturday, cleared up before the time of starting, so that the trip down the Seine was thoroughly enjoyed. Luncheon was served, at the invitation of the Reception Committee, at the Restaurant du Pavillon Henri IV., on the terrace of St. Germain. Afterwards a visit was paid to the castle, members returning to town by train.

In the evening, M. Faure, the President of the Republic, gave a reception at the Elysée in honour of the visit of the Institution, and all of the members attending the meeting received invitations. Each invitation included a lady, and a distinguished company of French officers and others also attended. Several selections were rendered by the famous band of the Republican Guard, and there were also vocal performances by well-known

French artistes. Lord Brassey was not able to be present, having been compelled to return to London on the previous day, and Sir William White was also unavoidably absent, but among those who attended we noticed Sir Nathaniel Barnaby, Mr. J. I. Thornycroft, Mr. B. Martell, Professor F. Elgar, LL.D., Mr. A. F. Yarrow, Mr. F. C. Marshall, Mr. A. E. Seaton, Mr. A. Denny, Mr. D. Dunlop, Mr. J. Corry, Admiral Fitzgerald, Admiral Bowden-Smith, Captain Eardley Wilmot, R.N., Mr. G. W. Manuel (P. & O. Co.), Mr. C. S. Du Sautoy (Union Steamship Co.), Mr. Archibald Thomson, Mr. John Gravell, Mr. G. A. Laws (Shipping Federation), Mr. J. D. Churchill, Mr. G. T. Harper, Mr. C. H. Rugg, M. Emile Bertin, M. Daynard, Mr. H. A. B. Cole, Mr. G. B. Craig, Mr. J. H. Hallett, Mr. R. H. Penny, Mr. W. G. Neal, Mr. W. C. Reader, Mr. T. F. Aukland, &c., with Mr. George Holmes (secretary).

We cannot close this notice without bearing our personal testimony to the ability, care and thoughtfulness with which the proceedings were carried out by the Reception Committee, especially with reference to Mr. Bertin, the chairman of the Executive Committee, and Mr. George Holmes, the secretary of the Institution, and we would here make special reference to the extremely clever manner in which M. de Pulligny during the discussions acted as interpreter, picking up the speech of the members, without missing figures or the intricacies of details, and translating the same into the other language, so that members not understanding French had an opportunity of appreciating the points of interest of all the discussions that were in that language, and *vice versa* in the same way with reference to the English discussion.

## SYER'S APPARATUS FOR RAISING SUNKEN SHIPS.

THE question of raising sunken ships is a matter upon which a very small proportion of the community can claim to have any special knowledge of or be experts in. Among the methods usually adopted to carry out this operation, two may be taken as the typical and only practical methods that have been successfully employed. The one method is the raising of the vessel by means of camels, or vessels at the surface of the water and ropes or hawsers passing round or attached to the sunken ship, and made fast to the camels or vessels on the surface of the water; and the other method is the building of a cofferdam from the vessel to above the surface of the water and pumping the water from the space enclosed thereby. It has long been known that the disadvantages attaching to the first method, among others, are—the danger of the camels capsizing if allowed to sink too deep in the water; the great length of hawsers required for attaching in deep water; the dependence on the rise and fall of the tide; the liability of the hawsers to break by the strain produced by the motion of the water at the surface; and lastly, the inability to raise a large sunken ship to the surface of the water. The second method is only applicable when the sunken ship is in shallow water, and is very costly to carry out.

We have now the opportunity, which we readily embrace, of bringing to the notice of our readers a most interesting and novel apparatus for raising sunken and stranded ships, which has been invented by Mr. W. Syer, of James' Place, Old Trafford, Manchester, working models of which we recently had the pleasure of inspecting at Connaught Mansions, 34, Victoria Street, Westminster. We illustrate the invention in the adjoining diagram.

The invention consists of two sinkable and raisable

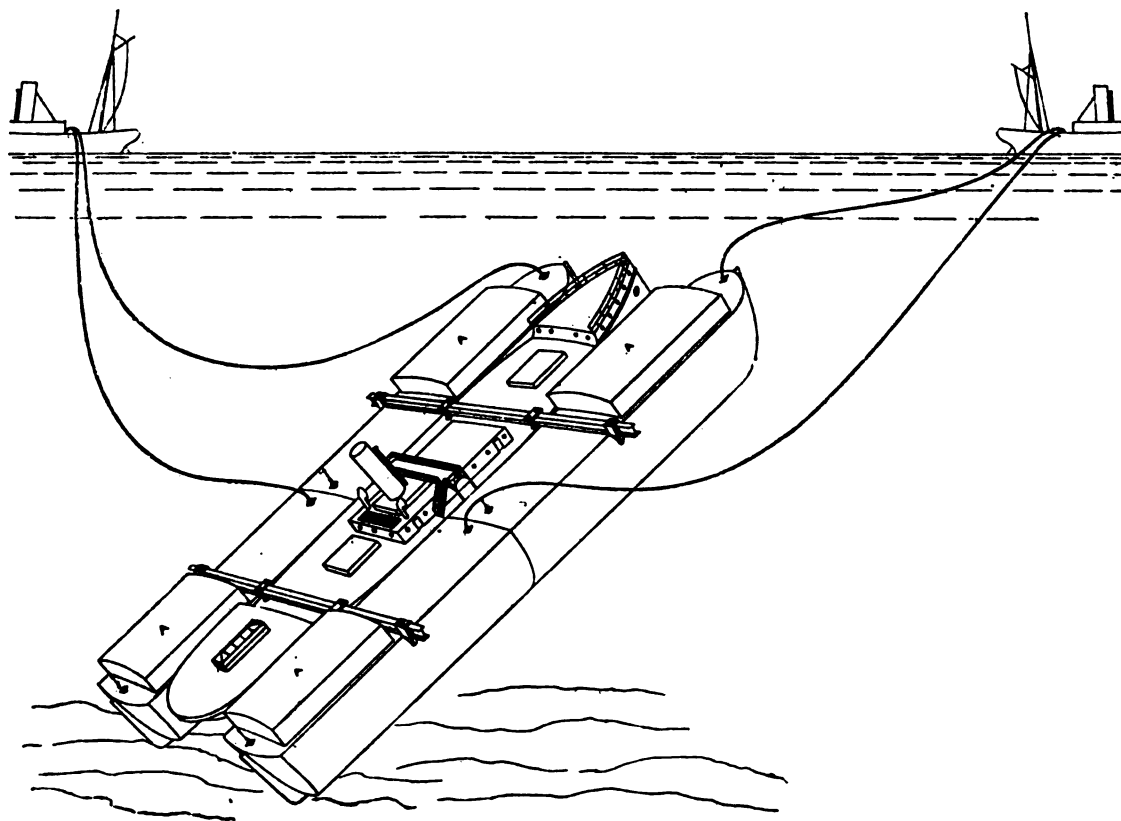
iron submarine vessels, which are perfectly controllable, and which are adapted to operate under two strong steel girders placed transversely across the deck of a sunken ship, to which they are attached in a most simple and efficient manner.

This submarine vessel is constructed somewhat in the form of a canal boat with an air-tight deck, and having an air-tight bulkhead across the middle extending from under the deck to the keelson, thus leaving two vast chambers, one in the fore and the other in the after part, either of which can be filled with water, or emptied, independently of the other.

On the deck of the submarine vessel, fore and aft, are constructed two permanent air-cases or air-receptacles, of such dimensions as not to prevent the vessel from sinking when its chambers are filled with

The construction of the submarine vessel is on such lines as to render it perfectly navigable when floating on the surface of the water; it can be operated (irrespective of tides) in any depth of water where divers can work, and can be constructed of such dimensions as to be capable of raising ships of very large tonnage.

We have had the opportunity of reading copies of reports on the apparatus, made by experts in this question, which contain statements that in their opinion the apparatus is of a very practical and controllable form. The scheme seems to us to be a very feasible one, and such as should be of great value in recovering many of the ships that are wrecked along the coast of this and neighbouring countries.



water, although they are of sufficient dimensions to retain its deck uppermost when submerged, thus rendering the submarine vessel non-capsizable and exceedingly buoyant when resting at the bottom of the water.

When the submarine vessels are required to be raised, the water is driven out of the chambers by the application of air, which is forced down a pneumatic hose in a similar manner as is done in the case of a diver.

By regulating the admission or escape of air through the pneumatic hose, the ends of the submarine vessels can be raised or lowered to any convenient angle with the greatest nicety, and they are, we are informed, capable of being easily moved to any required position by means of their great buoyancy.

**Twin-Screw Battleship "Renown."**—Remarkable progress is being made with the fitting on board of the machinery of Her Majesty's first-class twin-screw battleship *Renown* at Pembroke. In the first week of May her engines were in the erecting shops of their builders, Messrs. Maudslay, Sons, & Field, at Lambeth, awaiting transit. On May 8th the vessel was launched. By June 12th all the heavy parts of the machinery, with the boilers, had been transported to Pembroke and fitted in position on board the vessel, and by the 15th of the month the engine and boiler hatches and the decks in their vicinity—which had been kept loose for getting in the machinery—were being so quickly replaced and rivetted up that a very short time will see this part of the work completed. Great exertions are being made by the machinery contractors to have the vessel ready for her steam trials by the end of October next, so as to enable her to leave for Devonport—where she is to be completed—by the middle of the following month. To this end Messrs. Maudslay have agreed for a consideration in excess of their contract price to have the vessel ready by that time, or pay a daily forfeit if it is exceeded.



# ON THE UTILITY OF CALCULATING THE WHOLE EXTERNAL VOLUME OF SHIPS, AND CONSTRUCTING THE COMPLETE SCALE OF SOLIDITY FROM THE POINTS OF VIEW OF "STABILITY," "TONNAGE," AND "LOAD-LINE."

BY MONSIEUR DAYMARD, MEMBER.

THE calculations relating to the total amount of closed spaces of a ship and the construction of a complete scale of solidity are already employed by several naval architects and shipbuilders.

I take the liberty of recommending this practice, which may be useful either in the present or in the future, from the triple point of view of "stability," "tonnage," and "load-line."

I shall refer only to a few considerations on each of these three features.

## I.—Stability.

The disasters which have occurred in our time to merchant ships as well as men-of-war, which have capsized in a most unexpected and deplorable manner, and have been lost with all, or nearly all, on board, show that, notwithstanding the progress of modern science, the complication of actual ships is so great that it is more necessary now than ever to investigate thoroughly the stability in all cases, and particularly at large angles of inclination.

The forces tending either to right or to upset the vessel must be calculated, in all positions, and (as humorously expressed by one of our Vice-Presidents) the naval architect must completely capsize his ship on paper in order to assure himself that the like will never happen at sea.

This necessitates the finding of the total volume and the position of the "centre of bulk," an important point in tracing the general curves of stability described and determined under the name of "Pantocarenes Isoclines,"† in a paper I had the honour of submitting to the Institution of Naval Architects in 1884.

In the case of an ironclad, with a protected deck and superstructures upon it, two vessels have to be considered: one formed by the protected part only, which may be all that is preserved after an action; the other, including all the superstructures and closed-in spaces, in order that also the stability, rolling, and nautical qualities of the undamaged ship may be investigated.

## II.—Legal Tonnage.

Notwithstanding the almost general adoption by maritime states of Morsoom's method for the internal measurement of ships, we sometimes arrive at widely different results in ascertaining the legal tonnage of ships.

After the warm discussion on the subject of Suez Canal rates at the International Committee, assembled at Constantinople in 1878, it may be admitted by impartial men that none of the maritime states possessed a quite satisfactory system for the determination of net tonnage. Moreover, it was necessary for the payment of the Suez Canal rates to adopt a special tonnage, which, although more rational than most of those used elsewhere, is still objectionable. The great divergences in the value of tonnage, not only in passing from one nation to another, but even within the same country, are extremely injurious and prejudicial to commercial affairs.

These differences occur principally from the way in which deductions are made, and result also from the difficulty of fixing exactly the internal capacities, which must be included in Morsoom's measurement—for example, the water-ballast spaces.

It is not an exaggeration to say that with regard to tonnage, and especially referring to the different maritime states, a real "anarchy" prevails, which claims for pressing reform and international agreement.

Now, I think it would be possible to solve the problem by considering the whole external volume of ships.

In order not to alarm those who have to pay tonnage dues, it

is necessary to say at the outset that the *conditio sine qua non* of reform and unification of tonnage must be that the shipowners have, under no circumstances, to pay heavier dues than at present.

While desirous of introducing simplicity and uniformity, I do not forget that the first necessity is to tax at minimum rates the ships, which are, above all, the instruments of commerce and civilisation.

That being understood, I would propose the following general manner of establishing the tonnage.

The point of departure would be the total external volume without any deduction, but the "divisor" would be increased; instead of 2·83 for cubic "metres," or 100 for cubic feet, I should use, for example, divisors of double value.

In this way a figure would be arrived at proportional to the bulk of the ship, in relation to which it is reasonable to fix the dues paid on the gross tonnage.

The taxes on the net tonnage which must correspond to the importance of commercial operations, would be computed in exact proportion to the tonnage of goods loaded or discharged.

This is not an entirely new practice, and prevails already in several ports, notably in Spain.

The total effect, it may be repeated, would be to ensure that, after all, in average terms, shipowners would not have to pay increased rates, but even less, if it be possible without injuring the interest of states, corporations, or private bodies, which have to bear the expenses of lighthouses, ports, quays, &c.

At all events the basis of dues would be more equitable and rational than it is now, and we would no longer witness such shocking anomalies as a tug boat with a negative tonnage, or a vessel nominally of 70 tons discharging on the quay not less than 500 tons.

It would, in my opinion, be comparatively easy to solve the difficulties which perhaps might be raised as to the exactness of the "sheer plans" or "body plans" supplied by the shipowners and shipbuilders, for the measurement of volume and of reproducing drawings which sometimes did not exist at all.

Public departments, like the Board of Trade in the United Kingdom, or the "Administration de la Douane," in France, which have to ascertain the tonnage of ships are as competent to defeat any attempt at fraud by means of false plans of ships, as to guard against any erroneous information which might be supplied to them by shipbuilders concerning their engines, boilers, safety valves, and other mechanical appliances.

Measurements less complicated than those actually used for the calculation of gross tonnage will certainly allow verifications of the body plans supplied, or, in rare cases of very simple vessels of which no drawings exist, to make up for them with sufficient correctness.

Moreover, I do not think the objection can be raised that, even with the plans in hand, the calculations will present too great difficulty. They only require the most elementary knowledge of arithmetic and geometry, such as is now to be found in the most unimportant shipyard, and would, in fact, be more easy than those now necessary to ascertain the internal capacity, to make the corrections regarding the superstructures, the deductions, &c.

## III.—Limit of Draught or Load-Line.

Among the data required for fixing the maximum load-line with reference to security at sea, whether this line be fixed by the shipowner himself or by a compulsory Government rule, the most important element for each type of ships, other things being equal, is certainly the "percentage of reserved buoyancy."

Now, a complete scale of external displacement constructed from the calculation of the total volume, and which might be graduated in hundredths, will enable anyone to read off at a glance the "reserved buoyancy" corresponding to a given draught, or the draught corresponding to a required "percentage of reserved buoyancy."

I think that with this system the complication of measurements and calculations, also the chances of error, would be less. The basis would be more mathematical and clearer than with the method (which I have pleasure in acknowledging to be very ingenious) of "co-efficients of fineness," or the application of rules referring to the load-line.

## Abstract and Conclusion.

To sum up this paper, my object in recommending—

(a) The calculation of the whole external volume of ships,

\* Read at the Summer Meeting of the thirty-sixth Session of the Institution of Naval Architects, Paris, June 12th; the Right Hon. Lord BRASSER, President, in the chair.

† The above name may have looked perhaps rather barbarous, but it was, in my opinion, justified by the use generally admitted of the word "Isocline," originated by Charles Dupin.

(b) The fixing of the centre of this volume,  
 (c) The construction of the complete scale of solidity,  
 (d) The embodiment of these in the plans and specifications,  
 was to indicate that these data may be useful for the survey of stability, for a possible general reform and simplification of the rules of tonnage, and also for the fixing of the load-line.

The last point has been previously submitted at meetings of the Institution, but it appeared to me that it would not be without interest to insist upon the others, and to expose to light the bundle of reasons which shows the utility possibly to be found in the habitual use of the calculations and data in question.

## THE FLEETS OF THE MAIL LINES.

### The "St. Louis."

THE event of the month in this regard has certainly been the arrival of the new American liner *St. Louis*, at Southampton. It is a quarter of a century since an American-built passenger steamer has made her appearance in a British port. As most of my readers know, there were in the early seventies a set of four steamers called after States of the Union, built for the American Line by Messrs. Cramp, of Philadelphia. These vessels have plied between Liverpool and Philadelphia from that time to this in conjunction with certain British-owned and British-built steamers. The previous occasions of the same nature were nearer forty years ago, when the Collins liners were making their final efforts to justify their boast that they could run the Cunarders off the Atlantic. The Collins liners were wooden paddle steamers, however, and were built at New York. The early American liners were, it is true, built of iron, and were fitted with the screw, but they were never intended, like the Collins liners and the present ships, to compete in the front rank in the speed of their day. Thus the occasion of the arrival of s.s. *St. Louis* was naturally considered an event of considerable importance in the shipping world. For a long time it has been notified that the *St. Louis* would leave New York on her maiden trip on the 5th of June, and that announcement was made good by those responsible for the announcement. She left Philadelphia on a three days' trial cruise on the 26th May, and reached New York on the 29th. It was said that her performance was satisfactory but details were very carefully suppressed. On the appointed day she sailed from New York with a full complement of passengers, including the British Ambassador to Washington, a diplomat who, by the way, has not earned the gratitude of those connected with British shipping by his action in regard to this trip. Sir Julian Pauncefote showed his attachment to the country to whose court he is accredited by coming home in the *St. Louis* and by signing a puff in her favour. He, however, committed a singularly ungraceful action as regards those who pay the taxes which provide his salary, and possibly also his travelling expenses. On all hands it is admitted that British shipping is having a rough time. The competition of foreigners and our American cousins is making itself severely felt in trades which have long been British preserves. Whilst we encourage our shipping by leaving it severely alone, the foreigner has learnt to appreciate its value and he wishes to have part of the cream of the trade for himself. He has, accordingly, discriminated against the British ship and given bounties to the ship which sailed under his own flag. We have nothing to say against this action. It seems very wise. A Mercantile Marine may be planted and fostered by such means and may ultimately grow strong enough to run alone and to become a source of strength and prosperity to the nation at large. When, however, the British steamers are suffering from so great competition, when every patriotic American is trying all he can to give the steamers under the Stars and Stripes all the traffic he can in any way influence, when the Federal Government is giving a bounty of a sovereign a nautical mile to their vessels, then I contend that Britishers should make some effort to support their countrymen and not throw the weight of their official position—which rests on the trade of this country—into the scale against their own people. It may have been thoughtless on the part of Sir Julian Pauncefote, but a diplomat ought not to be thoughtless. If he is, he is obviously unfit for the delicate duties of his position.

This matter is however a digression, and I must return to the *St. Louis*, which left Sandy Hook at 5.15 p.m., on the 5th

of June. There was in the early part of the voyage some delay from fog. But she was sighted off Scilly at 3.45 p.m., on the 12th. Two hours and twenty minutes later she was reported off the Lizard, which is 46 miles nearer Southampton, and at 2.50 a.m. on the 13th she passed Hurst Castle. At 5 a.m., a little knot of officials and pressmen, who had spent the night awaiting her at the docks, went on board, and had an opportunity of seeing something of Messrs. Cramp's latest masterpiece. She is not very beautiful in appearance. The straight stem is a poor substitute for the graceful bows of the *Paris* and *New York*. The funnels look narrow and their peculiar tops are not attractive. The two stump masts are very short and curiously placed, whilst the removable topmasts are strange to eyes used to modern steamers. The bow plating, as seen from the dock wall when the steamer entered, looked somewhat rough. Seeing her bow on too, there was a peculiar and uninviting squareness about her upperworks. But she is a very fine ship nevertheless, and when one got a broadside view, and noticed the great sheer, when one got a hint of the lines that form her entrance and her run, one forgot the want of beauty in the petty details in admiration of her strength in more important points. The MARINE ENGINEER has given a full description of her machinery and her general characteristics. I need not recapitulate them. I will merely mention a few points that struck me as different to the Atlantic liner, to which we are accustomed.

To begin with, both the first and second-class saloons are on the spar-deck. This is a deck higher than British practice. It may tend to facilitate the opening of windows (one can hardly call the great openings now given portholes) but it has the disadvantages of making the apartment less than the full breadth of the ship, whilst it gives those traversing the deck outside an opportunity of looking in upon the assembled guests. The decoration of the apartment is original and highly effective. First-class passenger steamers have long been overdone with gilding and dark-toned decoration. The *St. Louis* marks a new departure in this regard. The colouring of the dome is light and quiet, as are the screens which form the alooves at the sides. The furniture of the room too is of light wood and the effect is excellent. The main companion—always one of the features of steamers of this class—is very spacious and the ornamentation most elaborate. Opening out of it is a very large and well-fitted library. The 'tween decks are in every case lofty, and great pains have been taken to give a very complete system of ventilation. What it all means is to some extent shown when one goes on to the promenade deck. This extends the full length of the ship as do those of the *Paris* and the *New York*. The midship part of this deck is covered with a permanent awning deck whereon are stored the boats. Thus the promenade is absolutely clear. There are bays in the deckhouse however, and these are formed by the protrusion of the ventilating shafts which lead from the boat deck down to the lower part of the ship. The magnitude of these shafts gives some idea of the vast amount of ventilation afforded. Notices are posted that all deck chairs must be kept inside the bays. Thus an uninterrupted course for exercise is secured to the promenaders whilst the sitters are shielded from the wind by the bays. The position of the saloon is, as is now usual, between the funnels, but the position of the first-class smoking-room is novel. It is far aft on the promenade deck and can only be approached by going on deck. This is not a matter which will commend itself to the experienced traveller. This room, too, though spacious, does not look cosy. It is square and stiff. The same strikes one as true of the ladies' cabin although that apartment is very richly furnished. To suit American taste there are several suites of cabins in the deck-house. These are very handsome and complete. A novelty in decoration is introduced by the substitution of indiarubber stamped with designs for the usual Japanese paper and Lincrusta, the idea being that this yielding substance will not sustain injury by the passage of the frequent and huge Saratoga trunks which are the joy of American ladies and the terror of all but their fair owners.

Of course, the *St. Louis* was not pressed on her voyage. I have given the times of arrival and departure. The length of passage was stated as being seven days three hours and fifty-three minutes. Her daily runs were 314, 443, 431, 441, 433, 432, 316 miles, making a total distance steamed of 3,159 miles. This would be an average of 18.87 knots.

A little trouble was experienced with her steering gear. This, however, has occasionally been a source of trouble in new steamers from British yards. Punctually to time she left Southampton on Saturday, the 15th, and the trouble with the

steering gear was renewed. On the 18th June, in lat. 46°58' N. long. 35°58' W., when 1,800 miles west of the Scillies, the rudder stock broke and the steering gear was consequently useless. She, however, proceeded, steering without much difficulty by means of her screws. Whereas her average speed prior to the disaster was 19 knots and a fraction, it now fell to 17½ knots. Her best day's run was 482 miles. This was up to noon of the 18th. The accident did not, in fact, prevent her making her eastward trip in due course. That will indeed be a feather in the cap of her owners and builders for promptitude. It is interesting to see that her first trip has made the *St. Louis* an example of the value of the twin-screw principle.

#### A Great Cargo Boat

was launched on the 22nd of June, by Messrs. Harland & Wolff, for the White Star freight service between Liverpool and New York. At present this line's direct service is maintained by four twin-screw, and two single-screw cargo steamers. As the round is made in five weeks there is a reserve steamer and one regular sailing in five is made by a single screw. The advent of the *Georgic*, as this leviathan is named, will make it possible to maintain the service throughout with twin screws. The *Georgic* makes the *Cevic*, hitherto the largest cargo boat, appear quite small. The net tonnage of this vessel is 6,580 tons, and her gross tonnage is about that of the mail steamers *Paris* and *New York*. Her carrying capacity is however something like 13,000 tons, and her displacement when fully loaded will range with that of the *Lucania* and *Campania*, being in excess of anything in the Royal Navy. The vessel is of course engineered by the builders, and has two sets of four-cylinder triple-expansion engines. There is accommodation for some 900 cattle and "saloon accommodation" for racehorses and pedigree animals amidships, where such valuable passengers will be least likely to experience discomfort from the movement of the ship.

#### Liverpool Improvements.

Before Southampton had seen the new liner which is to bring such an increase to her prosperity, Liverpool had made successful trial of her new convenience, the riverside station. Its working career was inaugurated by the departure of the rejuvenated *Germanic*. As is usual under such circumstances, the full advantages of the arrangement were not seen on the first attempt. Enough was done, however, to prove to everyone that Liverpool has done wonders since she awoke to the necessity for action, and that what she has done will be a very great boon to the travelling public. There had been some little difficulty in getting the railway department's certificate that the line might be used for passenger traffic down, as soon after the official inspection of the station and line as was expected. Thus it was not known till the last moment that the landing stage berth would be available to the *Germanic*. It was not till her passengers were well on their journey from London that it was found practicable to avoid in their case the tender and cab experiences whose recital has done so much for Southampton. Thus it was that the *Germanic's* special was just over five hours between Euston and the landing stage. This time will, of course, be very largely reduced on every subsequent occasion. But when the landing stage was opened to Atlantic liners, it at once became busy indeed. The *Catalonia*, inward bound from Boston, came up and landed her passengers lying to the northward of the *Germanic*, and before the latter got away, whilst the *Teutonic* from New York was landing her passengers across her smaller sister's decks. Since that day the new arrangements have been in constant service. The *Campania* sailed on the Saturday of that week, and the work was carried out in every way speedily, safely and satisfactorily. The big ship got away from the stage just 25 minutes after the special reached the station. This test showed that the landing-stage berth was available to vessels drawing 28 ft. A week later the *Umbria* took the outward sailing, and in her case it was seen that a little experience had enabled great economies in time to be effected. Her passengers had left Euston at noon, and she was ready to cast off at 4.30. Liverpool has thus apparently given her patrons all that Southampton can afford in the way of transshipment comforts. One's only sorrow is that she did not do it earlier. We must recognise that now all interested in the port are working strenuously for the common good without the reference to old-time prejudices and jealousies. But in the August issue I shall, I trust, be able to give an extended account of the riverside station and its surroundings. For the formal opening of the station is fixed for the 10th July, and I

look forward to enjoying the hospitality for which the Mersey Dock Board is famous on that occasion.

#### The Kiel Festivities

were chiefly of a military and naval character. Yet they were attended by several important mail steamers. The *Augusta Victoria* and the *Columbia* of the Hamburg-American Express service went through the Canal carrying the German Emperor's guests. For the purposes of this gathering, therefore, the line had to omit a sailing to New York. Besides these vessels the North-German Lloyd was represented—notably by the handsome liner *Kaiser Wilhelm II.* Great Britain had the Castle liner *Tantallon Castle* on the spot with a very distinguished party, including the chairman of the Castle line, Sir Donald Currie, and Mr. Gladstone. The *Tantallon Castle* did not, however, go through the canal. She proceeded to the Baltic end by the open sea route. There, too, was a great contingent of British public yachts. If the *Cleopatra*, formerly the *Chimborazo*, of the Pacific and Orient lines, be a fair specimen of a British yacht, they must have made a goodly show. For I saw the *Cleopatra* with her white hull and her graceful shape leaving Southampton for Kiel as I was waiting for the arrival of the *St. Louis* in the early dawn of Thursday, the 18th. Her decks and portholes were illuminated with electric lamps whose radiance was not yet paled by the breaking day. A prettier sight no man could wish to view.

#### A Pleasant Ceremony.

Under this head, I last month gave a note in which I referred to the brave deed of Lieutenant Brown, R.N.R., of the *Teutonic*, and of the attempt which had been made by those who knew the circumstances to procure for him a recognition of his heroism by the authorities. I am glad to say that that attempt has been crowned with success. Lieutenant Brown has been awarded an Albert medal of the second class. Long may he wear it, and soon may he recover from the ill effects of his fearful plunge. It appears that in his futile struggle to prevent the madman from leaping overboard his wrist was severely sprained. Yet, in spite of that, he sprang into the sea when the *Teutonic* was going at full speed. The force with which he struck the water may be gathered from the fact that the shock caused blood to flow from his mouth. When he and his charge were picked up he was almost dead from exhaustion. The suicide was past recovery. Lieutenant Brown has not been able to go to sea since, and it is greatly to be hoped that the experience will have no permanent effect upon his health.

#### The State Line.

There seems to be no rest for the vessels that formerly constituted the fleet of the ill-fated State Line. The *Mecca*, formerly the *State of Nevada*, is lying in the Liverpool Docks and ere this paragraph is in type will have been sold by order of the Marshal of the Admiralty Division. The *State of Alabama* is also under orders to be sold.

#### Publications.

I have received a very well bound and well illustrated volume from Messrs. Cramp, of Philadelphia. It is a record of their work from 1830 down to the present day. It comes at a singularly appropriate time when the *St. Louis* has just proved to us that the American shipbuilder is a worthy rival of our own. The volume is, as I have said, well illustrated and is worthy of the American reputation for book and magazine plates. It gives views and details of the vessels which the famous yard have turned out for the old and the new American Navies, and herein will therefore be found many of the most famous and interesting names associated with the fleet. Then, too, there are large numbers of fine vessels which have made for themselves reputations in the coasting trade which has been reserved for vessels trading under the Stars and Stripes. Besides these, there are, of course, the early American liners such as the *Ohio*, *Pennsylvania*, *Illinois*, and *Indiana*, and such famous sailing ships as the *Morning Light*. The Americans are a little touchy about their treatment from persons on this side in the matter of their aspirations to get back their former place as a great maritime nation. I do not think myself that we are as down on them—to use a slang phrase—as they think we are—but if we were, the publication of such a record as this would be the surest means of bringing us to our bearings. No one who sees this book can help feeling that the American shipbuilder has a past of which he may be proud. No one

who has seen the *St. Louis*, as I have done, can help feeling that he has a future to which he may look forward with confidence.

#### The Isle of Man Steam Packet Company

is one of the old-established shipping concerns which in spite of age and competition continue to prosper and to benefit their shareholders as well as the public whom they serve. I see with interest that their *Snafell*, built in 1876, has been fitted with her third set of boilers and with a complete set of electric light.

#### The "Salak."

An outward-bound mail steamer of the Rotterdam Line had a very narrow escape from total loss on the ill-starred Bembridge Ledge. She went on the top of a spring tide, and consequently lay almost high and dry. She had therefore to be completely discharged before there was any real hope of getting her off. She came off, however, at last and seems not to have sustained any very serious injury. The fog which we endured about the 22nd of June were very fatal to shipping. Our old friend the *Bessel* of the Liverpool, Brazil and River Plate Line, was one of the victims from the Fleets of the Mail Lines. The *Diana* of the London and South Western Railway Co.'s fleet was another. In each case it is satisfactory to learn that there was no loss of life. In the case of the Southampton boat, however, the mails were lost and the passengers' baggage also. This latter is a matter which always does a line great injury. I have long believed that it would be worth a company's while to give free insurance policies to passengers if they declared the value of their property beforehand, and went through one or two other formalities to insure the company against foul play. Such procedure would be a great inducement to passengers to use the lines and it would be a cheap generosity for the companies as the number of cases where passengers' baggage is lost is very slight indeed.

#### The Indian Trooping

is once more to be done by the vessels which last year performed such satisfactory service. The *Malabar*, the last active servant of Her Majesty's Indian troopships, will make another season's work. The other four vessels employed will be two P. & O. boats, and two of the British Indian Line, viz., the *Britannia*, *Victoria*, *Juma* and *Dikwara*. The agitation which has been aroused in Portsmouth against the removal of the trooping work from that port to Southampton, has been worse than useless, for it has not brought the work back. And not only has the work not come back, but the little that remained seems likely to follow suit. The Indian troopers last season returned via Portsmouth. Now they are to return to Southampton direct in order to land there the invalids. This because of the "proximity of Southampton to the Netley Hospital."

#### Southampton

indeed is doing well, though it cannot yet boast any fresh customers. In four days the arrivals and departures together aggregated upwards of seventy thousand tons of shipping. These included the *St. Louis* and the *Berlin*, of the American Line, the *Havel* and the *Kaiser Wilhelm II.*, of the North German Lloyd Line bound in from New York; the same company's *Sachsen* and *Spree* bound out, the former to the East, the latter to New York; the Hamburg-American Line's *Columbia*, bound outwards; and *Furst Bismarck*, bound inwards. Then there was the Royal Mail Co.'s *Nile*, and the Union Line *Trojan*, bound for South America and the Cape respectively with passengers and cargo, as well as the mail boat *Norham Castle* for the Cape. There was also a Union liner sailing to Hamburg to load. The *Berlin* and *St. Louis* being turned round quickly and despatched back to New York, come into the calculation a second time as outward-bound vessels. This is a very fine record for Southampton, and includes many fine steamers. We must remember, however,—if we wish to appreciate the true value of these figures—that the Castle liners load their cargo in London, that the Union boats get the bulk of their cargo from continental ports, and that the German-American Mail boats also only use Southampton as a port of call. Seventy thousand tons of shipping sounds a lot, and is a lot. But Liverpool would still think nothing of dealing with seventy thousand tons of shipping, or even twice that amount, in a single day, instead of in four, and in its case the tonnage would all make the Mersey, or at least its tributary canal, the terminus of the voyage.

### THE NEW CHANNEL STEAMER "WICKLOW."

IN our June number we gave full description of the City of Dublin Steam Packet Co.'s s.s. *Wicklow*.

In this number we are able, through the courtesy of the builders, Messrs. Blackwood & Gordon, Port-Glasgow, to give a view of the vessel (in our Supplement) from a photo taken by Messrs. W. Robertson & Co., Gourrock.

The dimensions of the vessel are:—Length, 260 ft.; breadth, 34 ft.; depth, 16 ft. 9 in.

### BELFAST INDUSTRIAL EXHIBITION.

(From our own Correspondent.)

#### No. II.

SINCE my last notes the Belfast Exhibition has improved both from a financial point of view and from a visitor's point of view. As everyone knows, it takes a good time after the opening to get everything in full swing so as to please everybody, and the latter is a very hard thing for a manager to do. Anyone will see that Mr. Shrapnel, the manager of the Belfast Exhibition, has made good use of the space at his disposal.

The gardens surrounding the buildings are now completed, and are lighted at night with electric arc lamps, which give a very fine effect when the visitors are promenading to the tunes of the splendid bands which the manager has had the luck to secure.

One of the chief attractions inside is the splendid water fountain, the invention of the clever manager, Mr. Shrapnel, it contains over 500 jets, and produces a very fine effect at night when the limelight is displayed on it from a platform at the highest span directly above.

To turn to the exhibits which are of interest to engineers, we find Messrs. Clarke, Chapman & Co., Limited, the well-known engineers of Gateshead-on-Tyne, well represented with their various productions. They show a pair of their well-known slow-speed high-pressure direct-acting feed pumps (Horne's patent). The cylinder is 8 ins. in diameter, the plunger, 6 ins. in diameter, and the stroke, 18 ins. The pair show the manner in which they are fitted on board ship for feeding main boilers, and are fitted with a float tank which is in direct communication with the hot well of the main engines. As the water drains into it, the float in tank lifts, opening stop valve, and pump starts, thus they are entirely automatically controlled. Each pump is capable of feeding a boiler developing 1,200 I.H.P. when running at a speed of 10 strokes per minute, and 1,800 I.H.P. at 15 strokes per minute. The most prominent feature about these pumps is the long steady stroke which avoids all wear and tear, and ensures a full chamber of water at every stroke. At the same time, in case of emergency, they can be run at 75 strokes per minute without damage to themselves. They also show their silent oil engine (Butler's patent) driving one of their well-known dynamos. The oil engine is capable of giving 8 B.H.P., and when running at a speed of 260 revolutions per minute the consumption of oil is about 6 pints per hour or  $\frac{1}{4}$  pint per B.H.P. per hour. The engine is of very simple construction, and is especially adapted for electric lighting, there being only one valve to control entire working. It is fitted with an ordinary fly-wheel governor. Automatic lubrication is fitted to all parts, ensuring a sufficient supply of oil at all times. Simplicity, quiet and easy running are obtained by eliminating all intermittently moving mechanism, such as cam lift, spring return poppet valves, levers, pumps, &c., and substituting in their place one balanced cylindrical slowly-rotating valve, which performs all the various functions required. This valve is easily accessible, and can be removed for examination and replaced in less than three minutes without requiring re-setting. Starting is quickly and easily performed by a small hand-pump, by which explosive mixture of oil is supplied to a chamber, an electric exploder being used in connection with this and the cylinder, resulting in a certainty of action.



THE CITY OF DUBLIN STEAM PACKET CO.'S S.S. "WICKLOW."







The dynamo which the engine is driving is one of the type of which Messrs. Clarke, Chapman & Co., make a lot, and is adapted principally for land lighting. It is compound wound and when running at a speed of 1,200 revolutions per minute is capable of giving an output of 160 ampères at 65 volts, that is to say, capable of lighting 160 16-C.P. lamps. It runs very smoothly and all absence from heating and sparking is one of its principal features.

The dynamo supplies current in the stand to three 300 C.P. incandescent lamps of the "Sunbeam" make, made at the Sunbeam Works, Gateshead-on-Tyne (Clarke, Chapman & Co.). They produce a brilliant, steady light and give the stand a very handsome appearance at night. Messrs. Clarke, Chapman's local representative is Mr. Charles Reynolds, 11, Chichester Street, Belfast.

The next stand to catch the eye of the engineer after leaving Messrs. Clarke, Chapman's is the handsomely fitted one of Messrs. Cooney & Swan, electrical engineers, 4, Skipper Street, Belfast, where they show samples of the different productions of the firms for which they are sole agents in Ireland, viz., Messrs. Robey & Co., Limited, Globe Works, Lincoln, and Messrs. Ernest Scott & Mountain, Close Works, Newcastle-on-Tyne.

Robey & Co. show one of their patent improved horizontal fixed oil engines. This engine is capable of giving 10½ B.H.P. and works on the principle of automatic internal ignition, and which has been proved to be superior to engines having outside lamps or combustion tubes heated by oil burning around them. By this method the formation of retort carbon is prevented, which occurs in ignition tube or flame vaporisers. A special lamp is fitted to engine (without wick) for heating internal vaporiser when starting; this lamp has a blast of air driven through it by a fan worked by hand wheel, driving small pinion by friction which is easy, silent and effective. Silencing chamber is of special construction and ensures a remarkably quiet exhaust. The number of working parts have been greatly reduced, are easily accessible, and the simplicity of the engine is remarkable. The rise of pressure through working stroke is gradual, and violent shocks avoided.

Messrs. Robey & Co. also show on stand their improved vertical high-speed steam engine, with cylinder 5½ in. diameter by 5 in. stroke. This engine, like all Messrs. Robey's productions, is remarkably simple, well finished, is fitted with governor, lubricating arrangements for continuous running, and is specially adapted for electric lighting. Besides these exhibits Messrs. Robey show in the electric plant portion of the exhibition a 24 B.H.P. gas engine. This engine is specially designed for electric lighting, being fitted with patent governor, balanced cranks with relieve necks of all unequal strain, continuous lubricating arrangements, indicator gear to enable visitors to examine diagrams taken from engine and see how charge is fixed and violent shock avoided. The crank shaft is of best mild steel, machined and polished, main bearings are of large size and fitted with special wedge arrangement whereby they can be adjusted without removing shaft, cap or brass.

Messrs. Ernest Scott & Mountain, Limited, show one of their well-known "Tyne" dynamos, driven by Robey's oil engine for supplying lights on stand. This dynamo, when running at 1,400 revolutions per minute, is capable of giving an output of 65 lamps at 65 volts or 3,900 Watts, and is capable of lighting 60 16-C.P. incandescent lamps, or incandescent and arc lamps together, which it does on stand, besides supplying current to motors exhibited. The chief features of this dynamo are simplicity, improved mechanical construction, rendering them suitable where skilled labour is difficult to obtain. Compactness, accessibility, and adjustability of all parts, high efficiency, light weight and moderate price, considering high quality.

They also show a "Tyne" electric motor, constructed on lines of above dynamo. It can be worked from any 65 volt circuit, and gives off 2 effective H.P. when running at 1,500 revs. per min. The chief merits of this machine are similar to dynamos. Among the exhibits is their well-known "Tyne" combined engine and dynamo, i.e., high speed steam engine, with cylinder 6 in. in diameter by 5 in. stroke, coupled direct on to dynamo, giving an output of 60 amp. at 65 volts, when running at 350 revs. per min., and capable of maintaining 60 16-C.P. lights. This type of plant is specially designed for ship lighting and other confined places. The engine is specially constructed for electric lighting purposes and for continuous running, and is fitted with necessary lubricating arrangements, steam stop valve, and is governed by the well-known Pickering Governor. The

dynamo is in most points similar to the ordinary "Tyne" type, slightly altered to suit extended bed plate.

A 2 ft. 6 in. combined fan and steam engine is also shown, as used on board steamers for forced draught or ventilation. This machine is specially constructed for continuous running, and is made from 24 in. in diameter to 72 in. diameter.

They also show a very pretty and well-finished set of launch engines, the high pressure cylinder is 6½ in. diameter, and the low pressure 11½ in. diameter by 8 in. stroke. This set of engines, which have been greatly admired since the exhibition opened, are very substantially built, fitted with reversing motion, complete lubricating arrangements. They have been specially designed for lightness, and can be run at a very high speed. A main switchboard is also fitted with all the latest type of instruments, &c.

A couple of arc lamps of the latest make and a number of 16 C.P. incandescent lamps give the stall a very brilliant appearance at night.

At the end of the electric lighting plant portion of the exhibition we find exhibited by Messrs. Beliard & Fletcher, engineers, Antwerp, two very neat vertical oil engines (Grob's system). These engines, which are of 6 and 4 N.H.P. respectively, are of very simple construction, and in the opinion of most of the engineers who have seen them in the Belfast Exhibition and other exhibitions, overcome all difficulties hitherto experienced in the manufacture of oil motors. The large engine is specially suitable for electric lighting, driving machinery of any description, etc.; the small one was specially built as a launch engine. The method of working is very simple. The piston going downwards opens one valve, sucking in air and a very small quantity of petroleum, which is instantly gasified by passing through a red hot vaporizer. The following upward movement of the piston compresses the mixture of air and petroleum vapour and presses part of it back into the vaporizer. The latter now acts as an ignitor, and the ignition and consequent expansion impels the piston again downwards. By the following upstroke of the piston the burnt gases are forced out through the exhaust valve, which has been opened by an arrangement in connection with the crank shaft just before the piston reaches its lowest point. This completes the cycle. It will be observed that one explosion is the consequence of every second revolution, there being one separate operation at every stroke of the piston, viz., 1, suction; 2, compression; 3, explosion; 4, exhaust.

No ignition tube is required, as the vaporizer also acts as an ignitor. These engines are very economical, the consumption of oil varies according to size, the small engines requiring about 1 pint per brake H.P. per hour, the large ones about three-quarters of a pint.

Messrs. Grob make these engines in sizes from ½ to 10 H.P. vertical (Land) and from 10 to 20 H.P.; horizontal; they make the launch engines from 2 to 10 H.P. in the single cylinder type and from 10 to 20 H.P. in the double cylinder type. They have obtained up to 1894 altogether 45 gold and silver medals, and obtain the highest awards everywhere they exhibit. They have sold up to 1894 about 3,000 oil engines; this in itself speaks for the engine which is without doubt the best oil motor at present before the public.

They also show alongside the stand their patent adjustable propeller and shaft. It is a very handy arrangement. Supposing the launch to be going full speed ahead, there is no necessity to stop the engine; all you have to do is to reverse the blades, by means of a lever which works on a spiral screw rod inside the hollow shaft, and the boat immediately goes astern; and if you want to stop you throw the engine out of gear by means of another lever. This is the first time these productions have been exhibited in this country, and it should not be long before their value becomes known among engineers. Messrs. Beliard & Fletcher's local depot is 6, Victoria Street, Belfast, and at the Belfast Exhibition.

In the model section we find a very fair representation of that art. Messrs. Denny & Bros., Dumbarton, show a very fine model of the twin-screw steamer *Duke of York* built by them a short time ago for the London and North Western Railway Co.'s Belfast and Fleetwood service. The *Duke of York* is of 1,600 tons register and 4,500 I.H.P. and is capable of steaming 19 knots. Messrs. Denny also show a model of the well-known paddle steamer *Princess Victoria*, built by them for the Larne and Straumar route. Her tonnage is 1,096 register, and she can steam 20 knots.

Perhaps the finest and best finished model in the exhibition

is that of the *Manitoba* shown by Messrs. Harland & Wolff. It is on the  $\frac{1}{2}$  in. scale and is complete in every detail. The *Manitoba* was built in 1893, by Messrs. Harland & Wolff, for the Atlantic Transport Co., and is a twin-screw steamer of 5,590 tons gross, and is fitted with triple-expansion engines of 3,000 I.H.P., and manganese bronze propellers.

Messrs. Laird Bros., Birkenhead, show a model of the twin-screw steamer *Duke of Clarence* built by them in 1894, for the London and North Western Railway Co.'s Belfast and Fleetwood service. She is of 1,998 tons gross, and 4,000 H.P., and steams about 18 $\frac{1}{2}$  knots.

The Fairfield Shipbuilding and Engineering Co., show a very fine specimen of their skill in model making in the model of R.M.S. *Hound* built by them last year for Messrs. Burns', Belfast and Ardrossan service. The *Hound* is a steamer of 1,060 tons gross, and has triple-expansion engines of 2,000 I.H.P., and can steam about 16 knots.

The Barrow Steam Navigation Co. show a half model of their paddle steamer *Manx Queen* which conducts the summer service between Barrow and Douglas, and the winter service between Belfast and Barrow.

Messrs. W. Doxford & Sons, Sunderland, show a half model of the screw steamer *Joseph John*. Her dimensions are 280 ft. by 38 ft. 3 in. by 29 ft. and of 2,125 tons gross. They also show half model of the steamer *Daniel* of 2,200 tons gross.

Messrs. Richardson, Duck show a half-model of the screw steamers *Vala* and *Valida* of 2,500 tons gross. Messrs. Workman, Clark & Co. show a model of a mail boat for ocean steamers.

At the right hand side of the entrance coming in, the Belfast and County Down Railway Co. show a model of the paddle steamers *Slieve Bernagh* and *Slieve Donald* which conducts the coast service between Belfast, Bangor, Larne, etc. The *Slieve Bernagh* is a steamer of about 380 tons, and has diagonal compound engines of 1,700 H.P., and can steam 18 knots. The *Slieve Donald* is of 340 tons and can steam 17 $\frac{1}{2}$  knots. Both these fine steamers were designed, constructed, and engined by Messrs. James & George Thomson, Clydebank, Glasgow. On the walls of the model section the Cunard Steamship Co. show some very fine photos of their steamers *Campania*, *Lucania*, *Umbria*, and *Etruria*. They show a photo of them at sea and also a photo of the various saloons, drawing-rooms, state-rooms, etc.

## NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondent.)

### The Naval Festival at Kiel.

THE principal naval event of the month has been the great gathering of warships at Kiel, on the occasion of the opening of the canal through Schleswig-Holstein, connecting the Baltic with the North Sea. No fewer than fourteen countries were represented by their vessels, many of them being of the very latest types of their various classes. From battleships to torpedo boats, every kind of vessel prepared for the next great naval war was represented in this monster fleet, which from the 17th to the 22nd of June rocked at its anchors in Kiel Haven. The countries which replied to the invitation of Germany by thus sending their ships and sailors, were Great Britain, France, Russia, Italy, Austria, Denmark, Norway, Portugal, Spain, Roumania, Sweden, Turkey, and the United States. Nearly fifty of these ships were of large size, thus Germany alone was represented by fourteen battleships and two fine cruisers; Great Britain sent four battleships and two heavy cruisers; Italy had four battleships; France and Russia contented themselves with one battleship and one heavy cruiser apiece; but these cruisers, severally the *Dupuy de Lôme* and *Rurik*, attracted as much attention as any vessels present. Austria-Hungary was represented by three large cruisers, and Spain by two, while the United States had four in line, including the *New York* and *Columbia*, which have shown themselves to be regular fliers. Altogether, such a collection of vessels have never been brought together before, and it is quite possible that such a gathering may never occur again for a peaceful purpose.

### Opening of the Canal.

Apart from the gathering of the Fleet at Kiel, the programme of the ceremonies was a most interesting affair, teeming with unusual and grand spectacles. On the 19th of June, the Emperor William, with four of his sons, went to Hamburg, where, at a

banquet given by the civil authorities in his honour, his Majesty declared that the armoured might assembled in Kiel harbour should serve as a symbol of peace, of the working together of civilized peoples for the maintenance of the mission of civilization. Here, too, in spite of adverse weather, a great concert and display of fireworks celebrated the joy of the people of the Hanse towns at the completion of a wonderful piece of engineering work which, while it has great strategical uses, is nevertheless bound to be also a boon to navigation and a blessing to the interests of peaceful endeavour. On the following day a procession of steamers and yachts, headed by the *Hohenzollern*, in which was the Emperor, passed through the canal, the Imperial yacht severing a woollen thread to symbolise the opening of the waterway. Twenty-three vessels made the tour of the canal from Brunsbüttel on the German Ocean to Holtenau in the harbour of Kiel on the Baltic. Among these vessels were the *Osborne*, with the Duke of York, *Savoia*, with the Duke of Genoa, and the *Brabant*, with Archduke Stefan of Austria; the Regent of Bavaria, the Kings of Saxony and Wurtemberg, the Grand Duke Alexis of Russia, the Duke of Saxe-Coburg Gotha, and other illustrious personages also were in various ships. When the Emperor arrived at Kiel he was greeted with salutes from all the assembled ships, and various festivities filled up the week, until the ships separated. Altogether the celebration was a great success.

### Visit of Italian and Spanish Warships.

Early next month two foreign fleets will arrive in British ports as guests of the nation, to represent the Powers to which they severally belong. On the 9th July, an Italian fleet consisting of four battleships, the *Re Umberto*, *Andrea Doria*, *Sardagna* and *Ruggieri di Lauria*, two cruisers, the *Stromboli* and *Etruria*, and two torpedo gun vessels, the *Aretusa* and *Partenope*, will arrive at Spithead and make a stay of six days. The Duke of Genoa, who commands the squadron, will also be present in his yacht, the *Savoia*. The Spanish squadron, consisting of the *Pelayo*, *Maria Teresa* and *Ensenada*, will visit Plymouth a few days later and be entertained at that port. The festivities in connection with the Italian visit, which include a banquet by the Naval Commander-in-Chief, a garden party by the General commanding the Southern District, entertainments by the Municipality to both officers and men, and an inspection of the dockyards, will wind up on the 18th with a review of the combined squadrons, for our Channel Fleet will be present, by the Prince of Wales. This last-named function will be a grand affair, and will conclude with the illumination of the fleets. On the following week, on the 17th, the partial mobilization for manœuvres will take place, and so far as is known, the manœuvres this year will be on as big a scale and quite as interesting and instructive as any of their predecessors.

### Portsmouth Dockyard.

Good progress is being made with the *Majestic*, four out of eight casemates on the main-deck have received their armour plates, and one of those on the upper-deck. The conning tower was lifted bodily into place, and thus the experiment of lifting these heavy weights into position, for which course economy is claimed, has been crowned with success. The *Eclipse* is not progressing so fast, but a good many workmen are still at work upon her. Admiral Fane's new signalling drum is to be fixed on board the battleship *Alexandra*, and the cruiser *Naiad*, for trial. The *Pallas* has been taken in hand for refit. The *Boxer*, torpedo-boat destroyer, has been delivered here. The *Gibraltar*, lately home from China, paid off on the 18th inst. The *Gladiator*, which is to be built here, has not yet been put in hand. Her armament will consist of 27 quick-firing guns: four 10-in., six 47-in., eight 12-pounder 12 cwt. guns, one 12-pounder 8 cwt. gun, three 3-pounders, and five Maxim guns. One 18-in. submerged torpedo discharge tube will be placed on each broadside. The battleship *Prince George* will be launched on August 22nd, the christening ceremony being performed by the Duchess of York. When launched the ship will be of only 4,000 tons displacement. Between 600 and 700 men are employed at work here on the excavations for the two new docks, but it is hoped that by next month this preliminary portion of the work will be completed, and that then it will only remain to put the masonry in place. This will be formed of concrete, brick, and granite, so that it is no light task, but the contractors are sanguine of finishing in time. The *Cæsar* grows slowly upwards, and will show no great progress for some time.

### Birthday Honours and the Navy.

The distribution of honours which is customary in connection with the recurrence of her Majesty's birthday, is noteworthy this year, both because of the greater number allotted to the sea service and because of the wider recognition in this form of the labours of those branches which go to make up the sum total of the efficiency of the Fleet. In previous years there has been a good deal of grumbling at the authorities on this account, but it is to be remembered that the proportion of these honourable distinctions placed at the disposal of the Queen is measured only by death vacancies or an increase of the members of the various orders, the latter course being unusual in peace time. This year death has been very busy among the older officers and therefore the number of honours for distribution is proportionately larger. Sir Veasey Hamilton, Sir William Dowell and the Earl of Clanwilliam were made G.C.B.'s. Two of these officers are retired and one is still on the active list, while the distinguished services of all three cannot be gainsaid. Sir Charles Hotham and Sir Robert Fitzroy become K.C.B.'s, and a similar mark of royal favour is conferred on Sir J. N. Dick, the Medical Inspector-General of the Navy. Popular as these selections are, still more so is the well-deserved recognition of the engineering branch in the person of Mr. A. J. Durston, the Engineer-in-Chief of the Navy, who receives a C.B. This appointment cannot but give satisfaction to the engineers of the Royal Navy, while it may also be taken indirectly as a compliment to all members of the engineering profession. It is also a gratifying means of saying that the highest officials believe that the somewhat captious criticisms of the engineering branch to which we have been treated lately are without any solid foundation. The Hydrographer of the Navy, the Director of Architectural Works, and a Royal Naval Reserve officer are also singled out for honours; the last-named especially being a most proper distinction of a very praiseworthy body though one of its most hardworking members.

### The "Terrible" and "Powerful."

These two first-class cruisers are to be ready for sea next year or early in 1897. They are each 500 ft. long between perpendiculars, or 538 ft. over all, and 71 ft. wide, are designed to have a normal draught of water of 27 ft. and to be 14,200 tons in displacement. As is well known, the steam for the engines of 25,000 H.P. for each cruiser will be supplied by Belleville boilers, the decision to use which has given rise to considerable controversy. The *Terrible* was launched on May 27th, from the yard of Messrs. J. & G. Thomson, at Clydebank, and the *Powerful*, building at Barrow-in-Furness, will be ready to take the water on July 24th. Lady Overton officiated at the christening ceremony of the *Terrible*. A tabular statement in the "Naval Annual" enables us to draw an interesting comparison between these two British cruisers, the Russian *Rurik*, the French *d'Entrecasteaux* and the American *Columbia*, respectively the heaviest cruisers of the nations to which they belong. The displacement, which we are taught to regard as meaning power of some kind, is largely on the side of the British ships, being 14,200 tons, as against 10,923 tons for the Russian, 7,960 for the French and 7,475 tons for the American cruiser. In point of length the superiority is also clear, for they run 500 ft. (British), 396 ft. 6 in. (Russian), 384 ft. (French), and 412 ft. (United States). In H.P., in armament and in protection the British vessels also show superiority, although in some instances it is not very large. The *Rurik* is the only one of the four types which is supplied with a belt (10 in.) instead of deck protection, but then she is barque-rigged, which must militate against her speed.

### Devonport Dockyard.

The *Tamar* was commissioned here in the last few days of May, to replace the *Victor Emmanuel* at Hong Kong as receiving ship, she left for her station on June 15th. This is the eleventh ship to hoist the pennant at this yard since the beginning of the new year, the others being the *Sybilie*, *Rainbow*, *Retribution*, *Sirius*, *Pique*, *Dreadnought*, *Thunderer*, *Ferret*, *Spider* and *Halcyon*. Mr. F. D. Hobbs, Chief Engineer, and assistant to the Chief Engineer at Keyham Yard, will be relieved by Mr. C. W. Gregory, Chief Engineer, who is returning from the *Mohawk*, on the West Indies Station, to take up the appointment, which is worth £400 a year. The post of Chief Engineer of Keyham, which is worth £562, as well as an official residence, is now held by Mr. R. Mayston, Fleet Engineer. Mr. W. F.

Hincholiff, Senior Instructing Engineer at the Royal Naval Engineering College, Keyham, having been appointed to the *Revenge*, his appointment has been filled by Mr. J. Richardson, who was recently engineer of the *Philomel*. The *Algerine*, which was launched here on June 6th, makes the third vessel to take the water from this yard this year. The keel plates of the new cruisers, *Arrogant* and *Furious*, have been laid down on slips 3 and 5 respectively, and they are the only vessels now building in the yard, those completing being the *Talbot*, *Phoenix*, *Algerine*, and seven torpedo-boat destroyers, the *Lynx*, *Rocket*, *Ferret*, *Shark*, *Surley*, *Content* and *Banshee*. At this yard preparation is now being made for the mobilization, which is to take place on the 17th of next month, when a large number of cruisers and torpedo craft will be put in commission.

### The "Sultan" Revivimus.

In 1889 the *Sultan* battleship sank, as everyone is aware, in the Comino Channel, near Malta, while engaged in doing torpedo practice. After some weeks she was raised, a pretty piece of engineering, and in November of that year returned to Portsmouth Dockyard. Now, six years after the mishap, she is once more fit for sea, and in the opinion of many professional men, is not only as good as ever, but better. New decks, cabins, and topsides have been fitted, military masts and fighting tops have been substituted for the old sticks and sails, she has been given more beam at the waterline, and a number of quick-firing guns have been added to her armament. But over and above this she has been supplied with modern propelling engines by Messrs. Thomson, of Clydebank. The engines are of the inverted triple-expansion type, and steam is supplied to them by eight single-ended boilers. On May 30th she was taken to Spithead to make her eighth hours natural draught trial, when the following data was obtained:—Boiler pressure, 147.7 lb.; vac. 25½ in.; revolutions, 88.7; I.H.P. 6,531. No air pressure was used, and the mean speed by patent log was 14.6 knots. The ship was somewhat light, the draught of water being 21 ft. 6 in. forward, and 24 ft. 9 in. aft. The forced draught trial for four hours took place on the following day, and was most satisfactory. With an air pressure of half an inch, 151 lbs. boiler pressure, vac. 25.9 inches, the H.P. attained was 8,244, and the speed 15 knots an hour. She has since undergone a continuous thirty hours steam trial.

### An Engineering Report.

It is a common subject of remark that the Admiralty should not publish some of the large stock of information with regard to machinery and boilers which is known to be stowed away in its pigeon-holes. A contemporary, referring to this subject, makes the excellent suggestion that an engineering report should be issued confidentially to the captains of ships in commission, for the use and reference of the officers of Her Majesty's vessels. The valuable results of issuing an annual report of the gunnery and torpedo schools is quoted as a proof of the wisdom of the Admiralty in taking its officers into its confidence. The same idea might be carried still further by appointing an engineer officer to the Intelligence Department of the Admiralty, and engineer officers as assistants to our Naval Attachés abroad. There can be no question that by the latter plan a large amount of valuable information would be speedily placed at the disposal of the authorities, and the carrying out of the former would provide the Intelligence section with professional technical assistance for collating and recording it. There can be no difficulty in finding among the engineer officers of the Navy men with the necessary qualifications, linguistic and otherwise, and these appointments would not only go far to allay discontent by its appreciative complement, but would be of material benefit to the service, the engineering profession, and the nation at large.

### Chatham Dockyard.

The *Magnificent* is growing here by rapid strides, the forward and after barbettes are ready for mounting the 12-in. guns as soon as they are delivered. The casemating work is now in hand and will progress rapidly as soon as the plates come to hand. The *Victoria* is also being prepared for speedy launching, and it is expected that she will take the water in October. By that date it is hoped that the contractors, Messrs. Hawthorn, Leslie & Co., will have the engines and boilers ready for her. The cruiser *Terpsichore* has been fitted with new 6-in. quick-firing guns and is now ready for the pennant. The *Blake*, recently the flagship on the West Indies station, paid off on June 18, and will be taken in hand at once for an extensive refit,

both of armament, engines and boilers. The *Monarch*, which has been partially supplied with new armament and wholly with new engines and boilers, is to be prepared for commission. The *Illustrious*, battleship, is steadily advancing towards a state of readiness for launching, and materials for the new cruiser *Vindictive* are being delivered; this last-named vessel will probably be commenced as soon as the *Minerva*, which has been waiting for her engines, built in the yard, is launched, an event now expected to take place in July. As soon as the *Minerva* is afloat her engines will be placed on board. The *Severn* paid off here on June 18th, and has been, like the *Blake*, placed in the B reserve. The Lords of the Admiralty are expected here to make their annual inspection in the first week of July; there will be a goodly number of vessels ready for mobilisation to show them, and they will be sure to take great interest in the *Magnificent* as the first of the Spencer programme battleships to make her steam trials.

#### The Cost of Ships of War.

A Parliamentary paper recently issued, throws much light upon the cost of warships, and their armament, machinery, &c. The prices given are mainly those to contractors, but from other sources the expense of building ships in the public dockyards can be obtained. No real comparison can be drawn between the two, of course, for the maintenance of the public yards is imperative for many sound reasons, and therefore there are items connected with the cost of vessels built in them from which those constructed in the private yards are free. However, when we remember that the private builder has to make a profit, we must not be surprised at the cost of employing them, and it has been fully demonstrated that it is as essential to the efficiency of our resources to give experience to the private contractors as it is to maintain public establishments. Messrs. Thomson of Clydebank, for the hull and machinery of the battleship *Jupiter*, are to receive £782,683, and for the cruiser *Terrible*, about £570,000. Messrs. Laird will receive for the battleship *Mars*, £788,211; and the Barrow Co. as much for the cruiser *Powerful*, as Thomsons' do for her sister ship. Messrs. Mandalay, who are the agents for the Belleville boilers in England, receive in royalties for the French firm, £10,600, but they will not construct the boilers in their shops. The *Talbot* class of cruiser, of which several are being constructed in Scotland, costs about £210,000 apiece, while the torpedo-boat destroyers average about £35,000 apiece, the lowest price being £33,474 for the *Hornet*, and the highest £30,665 for the *Zebra*.

#### Pembroke Yard.

The *Renown* is to be got ready to leave here for Devonport in November next. Her boilers and machinery have arrived and been placed on board, and a large number of hands have been taken from the *Hannibal* to expedite the work on her. It is anticipated that she will be ready for her steam trials by the second week in November, and that they will take place here under the supervision of the authorities and the contractors, Messrs. Maudslay, Field & Sons. An understanding has been arrived at with this firm, by which it will receive an additional £1,600 in the event of the ship being ready to go to Devonport on Nov. 15th, but will forfeit £60 for each day's delay after that date. The total cost of the propelling machinery of this vessel is £83,560, and as the contractors will have to work their men extra time, it is likely that the additional cost will absorb all the bonus. All the heavy parts of the machinery are already in place, and the decks have been closed in on them. It seems likely that the cruiser *Andromeda*, which is to be built here, will have a similar record to the *Renown*, and that which the *Hannibal* at present promises to make. The drawings have not yet been received, and it is therefore impossible to say when she will be put in hand. There are great hopes that the discussion in Parliament with regard to this yard will result in something being done to bring it up to date in modern requirements. It is reported that one dock and building shed is to be enlarged, and two others covered in.

#### The "Sharpshooter's" Trials.

For the purpose of making additional tests of the Belleville boiler it is intended to make some exhaustive trials with the *Sharpshooter* gunboat, in which boilers of this type are fitted. These boilers are of precisely the same construction as those with which the *Powerful* and *Terrible* are to be supplied, but they are somewhat smaller. The programme of the trials,

which has just been published, provides that the vessel shall run four trips, each of 1,000 miles, and during each trip the engines are to be allowed to develop an average I.H.P. of 1,530. She will then run two more trips, each of 1,000 miles, developing an average of 1,800 H.P. Then two more trips will be made with the average H.P. raised to 2,000, and finally one trip of about 1,000 miles, or until the coal abaft of the boilers has been used with 2,150 H.P. The trips will be made westward from Plymouth, at the option of the captain of the gunboat.

#### Contracts, Launches and Trials.

The torpedo destroyer *Sunfish* was launched from the Hebburn yard of Messrs. R. & W. Hawthorn, Leslie & Co. and christened by Lady Browne, of Westacre, on June 2nd. The *Algerine* sloop was launched from Devonport Yard on June 6th, and was christened by Mrs. Heaton, wife of Major Wilfred Heaton, and niece of Rear-Admiral Church, the superintendent of the yard. Her engines are being built at Keyham factory. The torpedo-boat destroyer *Spitfire* was launched from the Elswick yard of Sir William Armstrong, Mitchell & Co. on June 7th. Two vessels of a similar type, the *Salmon* and the *Sandwich*, have been delivered by Messrs. Earle, of Hull, during the month. The *Bruiser* has also been delivered at Portsmouth from the yard of Messrs. Yarrow. In addition to the 42 torpedo boat destroyers already ordered, and which have to attain a minimum speed of 27 knots, it has now been decided to order 20 more, which are to be capable of 30 knots on a continuous three hours official trial. Messrs. Thornycroft, Lairds and Thomson have each got a contract to build four of these boats, which are to be built of nickel steel, and to be fitted with water tube boilers. It is noteworthy that the Admiralty have not given a contract to Messrs. Jarrow for any other of their boats, but there are eight more to be ordered.

#### Sheerness Yard.

A good start has been made on the two new cruisers which are to be constructed in this yard. The *Polorus* is in hand, and the *Proserpine*, which has been laid off, will be begun shortly. The engines and boilers of the latter ship will be made at Devonport yard, while those for the *Polorus* will be given out to contract. The *Ruby* was completed for her final cruise here in May, and the refit of the *Comus* and *Champion* is in progress. The *Luck*, sloop, which was launched here on December 28th last, is now ready for her steam trials, and as the *Alert* is still waiting for her guns, it is probably that she may be the first of these twin sisters to hoist the pennant. These trials commenced on June 24th. The *Champion* was paid off here on June 7th, and her refit is intended, like that of her sister, the *Comus*, to prepare her for the Training Squadron. The boom defence vessels, *Watchful*, *Firm*, *Mistletoe*, *Banterer*, and *Grappler*, are now in almost complete readiness to form this obstruction, and a number of extra workmen and riggers have been sent here from Chatham to assist in this work. No date has yet been fixed for the trials, but it is not impossible that when their Lordships make their annual visit on their return from Kiel something may be done.

#### Jane's Naval Annual.

A new departure in naval journalism is to be made this month by the publication of a comic annual, to be called *Per Mare*. The editor is Mr. Jane, the well-known artist, who has been present at most of the naval manoeuvres, and whose sketches of naval life and manners are at least well appreciated by the officers of those ships on board of which he has taken passage. He has conceived the idea of issuing a Naval Annual, very fully illustrated, in which the naval events of the year are regarded from a humorous point of view, while the satirical aspect is not wanting to give additional piquancy to his venture. The late war in the East is pictured by native artists, our own naval manoeuvres treated in a light vein, and the would-be naval expert is held up to ridicule in a supremely funny manner. Nor is there any lack of light letterpress, the fun of which will be understood as well by landmen as those whose profession is of the sea. We have been permitted to see some of the proof sheets, and can assure our readers that they will find this book a good shillingsworth, over the perusal of which they cannot fail to have a hearty laugh. The gem of the collection is perhaps "The battleship of the future," a wonderful sketch, with elaborate description, after the fashion of the amateur naval architect, who so frequently figures in the newspapers just now as "one of the greatest living authorities on naval affairs."

### The Change of Government.

Mr. Goschen succeeds Lord Spencer as First Lord of the Admiralty, under the new Administration, and it may be taken for granted, therefore, that no great change of naval policy will follow. Nor will there be any material change in the professional constitution of the Admiralty Board. Who will be the new Secretary is a matter of doubt at the time we go to press, but it can hardly be Mr. A. B. Forwood, owing to the very great personal interest he has shown in the boiler controversy. Moreover it is pretty certain that he will not come back if the naval element at the Board can prevent it. Should the new Government become firmly established in power we shall expect to see the publication of a full naval programme next year, for the incoming Ministry is almost pledged to publicity in this matter, and with it we may very likely see a new Naval Defence Act, although if firmly seated in office this may not be considered necessary. The installation of the Duke of Devonshire as President of a Council of Defence is very generally looked upon as indicating the drawing together of the War Office and Admiralty under one head, or at the very least the carrying out of most of the recommendations of the Hartington Commission for the better co-operation and harmonious working of these two departments.

**The Irish Mail Contract.**—The Government have at last succeeded in coming to terms with the City of Dublin Steam Packet Co. regarding the Kingstown and Holyhead mails. The amount asked originally by the City of Dublin Steam Packet Co. was £130,000 per annum, but they have decided to take £100,000, which is £20,000 more than they are receiving at present, and the service, according to the new contract, is to be accelerated by half an hour. The City of Dublin Co. have agreed to build three paddle steamers of the following dimensions—371 ft. by 40 ft. by 29 ft. 3 in., and to have an I.H.P. of 8,250. The company have accepted no tender yet for the building of these steamers, but it is rumoured that the order is to be placed on the Clyde, either with Thomson or Fairfield, or divided. At a recent meeting of the Dublin Chamber of Commerce, a resolution was passed asking the City of Dublin Co. to have the steamers, if possible, given to Belfast firms, but it is not probable they will do this as there are no firms in Belfast who have such experience in that class of work as Fairfield or Thomson.

**John Dickinson and Sons, Limited.**—The old established business of John Dickinson, marine engineer and boiler builder, Palmer's Hill Engine Works, Sunderland, has been turned into a limited company on and after the first of this month, under the style or firm of John Dickinson & Sons, Limited. The management remains unchanged.

### HOAR & BROWN'S HARDWOOD MARKET REPORT, JUNE 24th, 1895.

TEAK.	Timber Loads.	Planks Loads.	Blocks Loads.	Total Loads.
Stock 1st June	6,354 ..	2,527 ..	60 ..	8,941
Landings	211 ..	129 ..	—	340
	6,565 ..	2,656 ..	60 ..	9,281
Deliveries	1,099 ..	177 ..	— ..	1,276
Stock 20th June	5,466 ..	2,479 ..	60 ..	8,005

The deliveries this month show fairly well, being over the average of the past year, and the landings have not been excessive. Some log sales without reserve have taken place. The quality had much to do with the excessively low figures realized; but viewed in another light, the sale plainly demonstrates the absurdity of forcing teak upon the market. Prices now are so demoralized that it is quite impossible for the moment to determine what is the real market value of teak, and until the cheap and faulty timber is removed, this stock will not be placed upon what may be termed a fair footing.

Planks have been imported so freely that owners are forced to realize their stock, with the disastrous result which usually

follows; and the same difficulty as with logs applies as regards values.

**MAHOGANY.**—This market is still very unsettled, and owners would do well to refrain from offering stock at public sales for a time, and thus give a chance to holders. The continual forcing of large cargoes upon the trade, only assists to keep prices falling, however much the tendency might be for a firmer tone if more sensible measures were adopted.

It is noticed that one importer, possessing a large weather-damaged stock, is biding his time, knowing full well that the sacrifice that must consequently take place would, if forced at the present moment, mean something unprecedented.

At a late sale, Honduras of 24 in. siding realized the low figure of 3½d. to 3¼d., and good 16-20 in. changed hands at 2½d. Such prices cannot be remembered during the present generation.

**CUBA** wood of small dimensions, which abounds both at the East and West wood wharves, will sooner or later have to meet its fate under the broker's hammer. Already several cargoes are stowed away quietly, and others continue to arrive, without the least demand being perceptible among the trade, except at ruinous speculative figures.

There is a fair sale for sound Panama at late values, and African appears to go off readily at the reduced rate. Mexican is slow of sale, partly in consequence of the inferior quality and size for money not competing with other classes.

**ORDER.**—Quietness reigns throughout, and the last parcel offered was anything but encouraging to dock merchants, considering the prices the wood fetched, 30 in. panel being knocked down at 3½d. Good boat logs are still greatly in demand.

**KAWRIE PINE.**—Importations just sufficient to feed the market have caused a genuine demand at importable prices, and although figures work out very closely, there just remains enough margin for shippers to save themselves from a loss.

**SEQUOIA.**—Some very cheap lines are offering, and the demand is next to nil. The present is a good time to pick up stock at the lowest rate.

**GREENHEART.**—A few enquiries are about for converted stuff, but the orders do not appear to reach London, although good selected logs are offered at £7 per load.

It is doubtful whether business has ever appeared more depressed than at the present moment, and the holiday-making season now approaching will not be likely to assist matters.

### INDUSTRIAL AND TRADE NOTES.

#### THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

**THE** Fairfield Shipbuilding and Engineering Co., Limited, early in the month secured an order from the Scottish Oriental Steamship Co., of London, to build a steamer of about 2,000 tons capacity for service in the Chinese fleet. The new vessel will be exactly similar to the *Koong Wai*, constructed at Fairfield for the same company and launched only a month or so ago. She will be fitted up for a limited number of first-class passengers.

Messrs. Robert Napier & Sons, Limited, shipbuilders, Govan, received an order in the early part of the month to build a vessel for China service to replace the *Pankuam*, which was wrecked a month or so ago on her trial voyage.

Messrs. Mackie & Thomson, shipbuilders, Govan, contracted early in the month to build two steam trawlers for Grimsby owners, each 120 ft. by 20 ft. by 12 ft. The vessels will be engined by a Glasgow firm.

Messrs. Hutson & Son, Kelvinhaugh Engine Works, contracted, early in the month, to supply engines for a 700 ton steamer, being built by Messrs. S. M'Knight, Ayr, to the order of Messrs. Colville, Lowden & Co., of Glasgow. The same firm have contracted to re-boiler and remodel the engines of the *St. Fagans*, of Cardiff, recently acquired by Messrs. Donald & Taylor, of Glasgow.

Messrs. Ramage & Ferguson, Limited, Leith, at the beginning of the month secured an order from Mr. Thomas Cowan, Grange-mouth, to construct a cargo steamer to carry over 1,200 tons deadweight. The same builders also booked orders to build an auxiliary steam yacht of 500 tons, and a full-powered steam yacht of 780 tons.

Messrs. David J. Dunlop & Co., Inch Works, Port-Glasgow, booked an order, in the first week of the month, to build three



small steel twin-screw steamers for towing purposes in French waters. The same firm will likewise supply the engines.

Messrs. Blackwood & Gordon, Port-Glasgow, are progressing rapidly with the new steamer for the Laird Line, which was ordered some two months ago. The vessel is to be delivered some time in August or early in September. The firm's hauling-up slip has been well patronised of late by the owners of large steam yachts, whose vessels have undergone external and, to a certain extent, internal decoration. The lengthening and re-boiling, &c., of the Ness Steam Shipping Co.'s paddle steamer *New Undaunted*, has been completed during the month, and the vessel is now on her station in the North.

Messrs. William Denny & Bros., Dumbarton, contracted with the London, Chatham and Dover Railway Co., early in the month, to build two paddle steamers for cross-Channel service between Dover and Calais. The same builders will construct the engines, which are expected to attain a high rate of speed.

Messrs. Rankine & Blackmore, Greenock, about midmonth contracted to engine a paddle steamer which is being constructed by Messrs. R. Duncan & Co. for a Spanish firm. She is for the opening of a new cattle trade from Malaga to Gibraltar, thence to Liverpool.

Messrs. S. M'Knight & Co., Ayr, at the beginning of the month booked an order to construct a 700 ton steamer for Messrs. Colvils, Lowden & Co., of Glasgow, the engines of which will be supplied by Messrs. Hutson & Son, of Kelvinhaugh.

Clyde marine engineers are busy preparing tenders for the construction of propelling machinery for three of the four second-class cruisers at present under construction in the Government Dockyards, viz., *Furious*, *Arrogant*, *Gladiator*. The machinery is to be of the triple-expansion twin-screw type, and the power is to be 10,000 I.H.P. under ordinary conditions. The details of design are left to the contractors, but it is distinctly laid down that Belleville boilers are to be adopted.

Messrs. William Hamilton & Co., shipbuilders, secured an order in the middle of the month to build a steel screw steamer of 4,600 tons carrying capacity for Liverpool owners. This is the second steamer of similar dimensions contracted for by this firm during the month for the same owners. They will both be supplied with triple-expansion engines by Messrs. David Rowan & Son, Glasgow.

With the launch of the *Dania*, a splendid steel screw steamer of 5,450 tons and over 350 ft. long, built for Messrs. Hickston, of Copenhagen—who have now a fleet of thirteen steamers, large and small—which event took place on the afternoon of June 25th, from the Greenock yard of Messrs. Russell & Co., also of Port-Glasgow, the period has been put to the term of Messrs. Russell & Co.'s occupancy and management of the Greenock shipyard. The berths there are now all empty, and already a considerable quantity of the plant has been transferred to the firm's larger, more modern, and altogether better-situated shipyard at Kingston, near Port-Glasgow. Here, under fully organised and better concentrated forces, Messrs. Russell & Co. have arranged for the conduct of shipbuilding work in all its branches. In the future as in the past, however, a considerable amount of their energies will be devoted to sailing ship construction.

It has been for some time past freely stated that a new firm have arranged to take up occupancy of the yard now virtually vacated by Messrs. Russell & Co., and the name of Mr. John Carmichael, until recently the manager of Messrs. Caird's yard, Greenock, is closely though not exclusively associated with the taking over of the vacated yard. Other names are mentioned, jointly with Mr. Carmichael's, of gentlemen who will share in the venture, at least one of whom has been identified with the conduct of the Greenock yard. It is said that the new firm will carry on the business of engineering and boiler-making in addition to shipbuilding. It is also reported that the new firm have secured a first order in the shape of a large sailing vessel, which will be proceeded with as soon as it will be possible to get the yard into proper order.

H.M. torpedo-boat catcher *Sturgeon*, after undergoing improvements at the hands of the builders, the Naval Armaments Co., Limited, Barrow, returned to the Clyde on Wednesday, 19th ult., for the purpose of undergoing her official speed trials on the measured mile at Skelmorlie. This she did on Saturday, 22nd ult., with satisfactory results. The average of six runs on the mile was 27.6, and the mean speed attained in the three hours' steaming 27½ knots per hour. The *Skate*—the sister ship to the *Sturgeon*—has arrived in Greenock, and in the course of a few days will also undergo her official speed trials.

Messrs. David Colville & Sons, Motherwell, secured an order during the month from the Admiralty for 3,500 tons of steel plates. The senior partner—Mr. David Colville—of this well-known firm, it may be mentioned, celebrated his golden wedding on Tuesday, the 18th ult. The whole of the works were profusely decorated, and at the entrance to the steel works an evergreen arch was erected by the workmen, bearing the inscription, "Long life to the grand old couple." A deputation of workmen travelled to Glasgow and presented Mr. and Mrs. Colville with a handsome illuminated address, which had been subscribed to by all the workmen.

An improved method for electro-plating the hulls of iron and steel vessels has just been patented by Mr. H. Cox, engineer, Greenock. The main object of the invention is the preservation of ships' bottoms from corrosion and fouling. In experimenting, several iron and steel plates were electro-plated and placed under the water for three months, and one of the floats of a first-class steamer was subjected to a similar test, and at the end of the period the copper was clean and free from fouling, while the unplated parts were very foul. It is claimed by the inventor that by this process the largest of vessels can be cleaned in about a week. A company is being formed with the view of carrying out the invention on a large scale in Greenock. Among several orders received, one is to electro-plate a ship having a surface of 2,000 ft. surer. for plating.

Messrs. James Menzies & Co., Dalmarnock Bridge, have added to their already varied manufactures the making of solid drawn seamless steel tubes. This class of tube is already largely made in Staffordshire, but Messrs. Menzies are the first to bring the manufacture to Scotland. The tubes have been found very efficient in torpedo-boat boilers, where the usual lapwelded tube was not considered good enough. Messrs. Menzies have secured an order from the Government to start with.

Messrs. Porteous & Crawford, Anderston Galvanising Works, Elliot Street, Glasgow, galvanised during the month, for the Fairfield Shipbuilding and Engineering Co., Limited, four of the largest condenser cylinders ever attempted to be galvanised in one piece, being 9 ft. 6 in. long by 8 ft. 10 in. in diameter, and weighing over four tons.

A commencement has now been made with the work of demolishing Glasgow Bridge, which has for 60 or 70 years connected Jamaica Street on the north, with Bridge Street on the south side of the Glasgow harbour. As is well known, the engineer of this very fine structure was Thomas Telford. The new bridge, which is to be erected in its stead, will cost £80,000, and the contractors—Messrs. Morrison & Mason—expect to have it finished within three years. A proposal, which has for some considerable time been before the Glasgow public, to bridge the Clyde some distance below the Glasgow Bridge, is now receiving favourable consideration, and in the course of a year or two may be an accomplished fact. Cross river communication in Glasgow will then be in a pretty perfect state, between tunnels under, ferries on, and bridges above, the water.

Messrs. William Wilson & Co., Lilybank Boiler Works, have just completed a small steel rivetted boiler, which is to stand a daily working pressure of 300 lbs. per square inch. This, it is understood, is the highest pressure for which a boiler with internal fire-box has ever been constructed. The boiler was tested to 450 lbs. per square inch, at which pressure it was perfectly "drop dry." The firm has also secured an order during the month for six boilers, to work at 185 lbs. per square inch.

Mr. H. Osbourne Bennie, sole partner of the firm of James Bennie & Sons, Clyde Engine Works, Polmadie, Glasgow, has assumed as partners Mr. J. Reid Bennie and Mr. Robert Mitchell, both of whom have an intimate knowledge of machine-tool making. The business will be carried on as formerly at the same works and under the old name.

The numerous Glasgow and West of Scotland firms making a speciality of heavy machine tools for shipyards and engine and boiler works, are glad to learn that there is to be a large expenditure of money in the purchase of new machinery for ship construction and engine and boiler manufacture at Devonport and Keyham Dockyards. Already, it is said, authority has been given for the purchase, during the present financial year, of £8,000 worth of this new machinery. In addition to this, the Admiralty have requested the dockyard officials at Devonport to propose a further list of the machinery chiefly required, at a cost of some £12,000. At least a share of Admiralty favours is expected on the Clyde.



## TRADE NOTES FROM THE TYNE, WEAR, TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

### THE TYNE.

**Shipbuilding.**—The long-expected revival in shipbuilding has not yet made itself very distinctly felt; and there are some pessimists who go so far as to say that it is yet a long way off. We are not disposed to accept this view, however, and still adhere to the opinion expressed last month that, before the end of the year, the quantity of work in local yards will be considerably augmented. Many circumstances point to the conclusion that an improvement in home trade is not far distant; but no better augury of coming expansion in business is being presented than the steady increase in demand for almost all products, and the accompanying appreciation of values that for some weeks past has been noticeable in America. We are pleased to note that the laid-up tonnage in the Tyne and other North-Eastern ports is now reduced to very limited proportions, and though the increased employment for ships is, in some degree, attributable to the recent opening of North Sea navigation, the circumstance that only a comparatively trifling amount of tonnage is now idle cannot but afford satisfaction to all who are interested in such matters.

Though the world's supply of shipping has not been sufficiently depleted to justify the recurrence of one of those extraordinary "booms" that have been witnessed in former years, there is still, as we have before indicated, ground for looking forward to a large increase in the volume of work available for partition among our various shipbuilding firms, those who can supply the best article, at the lowest cost, and in the shortest time, getting, of course, as they have always done and deserve to do, the largest share.

Preparations for launching a cruiser of moderate size are being made at Messrs. Armstrong, Mitchell & Co.'s Elswick Yard, and it will probably be put off the stocks before the end of the month. This will make the fourth vessel launched from the yard this year, and as the work of other vessels is being rapidly pushed forward it is expected that the output this year will be above the average. At the company's Low Walker yard a vessel is also being got ready for launching, and a larger production than usual is also expected to be reached at this establishment in the present year. The vessel about to be launched is a cargo boat of between 5,000 and 6,000 tons carrying capacity, which was put down on the speculative principle to keep as many as possible of the regular hands employed, at a time when no orders were forthcoming, and which has stood on the stocks in an almost completed state for nearly a couple of years. She has just been sold to a firm of French owners, and active measures are now being taken to put her into the water during the first week in July. The firm have a large oil ship on the stocks which was also brought to a near point of completion some time ago, but which, being unsold, was not put into the water. The firm have launched, this month, the railway ferry steamer for conveying trains across the river Volga, and are now sending away in sections a number of Russian barges that have been recently constructed in the yard. The railway ferry steamer is probably the most unique craft that was ever launched from any shipbuilding establishment, and the great firm who control the Elswick and Low Walker yards are to be complimented for their enterprise in undertaking the contract, and for the completely satisfactory manner in which they have brought it to completion.

Messrs. Hawthorn, Leslie & Co. have launched one of the torpedo destroyers which they are building for the Admiralty, and it is expected that the launching of the remaining two will soon follow. The splendid cargo steamer *Rakeia* which was built for the New Zealand Shipping Co., of London, for employment in the dead meat trade has just left the Tyne to proceed to London, previous to going upon her first voyage to New Zealand. This vessel has hold space enough for the storage of some 10,000 tons of ordinary cargo; but as the cargo in the particular trade for which she is intended will consist of sheep carcasses, which for effective refrigeration must be stowed separately by suspension from the decks, it is probable that the burthen she will have to carry will not exceed 5,000 tons. The vessel is perfectly equipped in all respects, and is undoubtedly one of the finest cargo boats that ever left the Tyne.

At Messrs. C. S. Swan & Hunter's yard, considerable briskness

exists, and as one or two further orders have been secured, it may be presumed that this satisfactory state of affairs will be maintained for some time yet. It is understood that the firm contemplate putting up in their west yard an erection over the building berths somewhat similar to that which they have, at such great expense, erected in the east yard. It is, however, to be of wood instead of iron, and may only be intended as a vehicle for the employment of a travelling crane, to hoist heavy materials from the ground to the positions they are meant to occupy in vessels under construction. The adjoining yard, which only a very few years ago was the scene of great activity in the hands of Messrs. Schlesinger, Davis & Co., is, we regret to note, still unoccupied, and so far as can be seen there is no immediate prospect of the establishment being restarted. The yard is too well adapted for economical production in shipbuilding to remain permanently idle, and we hope to see the machinery again in operation as soon as trade begins to flow in a somewhat stronger current.

The Tyne Shipbuilding Co. have secured orders for three steamers during the month, two of which are of large tonnage. The third, which is of comparatively small size, is ordered by local owners. The fine cargo steamer *Noviembre*, is being fitted out beside the yard.

It is reported that the Palmer Shipbuilding and Iron Co. have just booked an order from a local firm for a steamer of 6,000 tons carrying capacity. We are not in a position to confirm the statement, though we believe it is likely to prove correct. The company have a good many berths vacant at present, and some work is much needed to give to the immense yard at Jarrow an appearance in some degree approximate to its wonted activity. The fitting out of the P. & O. steamer *Borneo* has been going on actively since she was put into the water on May 23rd, and elaborate as is the vessel's equipment, it is now nearly completed. Messrs. Higginson, of Liverpool, contracted through their Newcastle representative for the fitting of the vessel's rigging, &c., with their patent steel blocks, over 200 of which were required. These blocks are rapidly gaining in popularity, as is evidenced by their employment in the fitting out of such a vessel as the *Borneo*.

Messrs. Readhead have recently booked an order for a 3,000 ton steamer for Norwegian owners, and they have a fine vessel ordered by London owners, getting fitted out at the sheerlegs. The firm have three other vessels on the stocks, and are as usual quite busy. The graving docks of Messrs. H. S. Edwards & Sons, are all occupied with vessels undergoing repair. The extensive alterations which have been some time in progress at Messrs. Morallie's dock, so as to enable the proprietors to cope more effectively with present-day repair work, are well advanced towards completion. The Commercial Dry Dock Co., Jarrow, have had a good deal of repair work this year and are just now fairly busy.

**Engineering.**—Throughout the various departments of the Elswick Ordnance and Engineering Works business has steadily improved since the opening of the year, and from time to time large additions have been made to the complements of men employed in the different shops. At the Newburn Steel Works, business has also shown some improvement, and recently some good orders for springs and other railway material have been secured. The plate mills are fairly busy, the demand for ship plates and the special quality of boiler plates manufactured at these works being well maintained.

At the Wallsend Slipway and Engineering Works the railway ferry steamer built by Messrs. Armstrong, Mitchell & Co. for Russia is being fitted with duplicate diagonal compound engines, and boilers of the semi-locomotive type, four in number. The engines and boilers have been specially designed to suit the peculiar form of the vessel. The ice breaker, which was built to run in conjunction with the ferry steamer, was engaged at the Slipway Works last month. At the North-Eastern Engineering Works, Wallsend, a satisfactory state of business exists; but at the Neptune Works, Low Walker, there is only a limited amount of work in hand. The St. Peter's Engine Works continue to be well employed on both Admiralty and mercantile orders, and at the Palmer Co.'s Works trade is tolerably good.

The Combination Metallic Packing Co., of Lombard Street, Newcastle, have lately received additional orders for their speciality, which has achieved a high reputation, and is largely employed in high-speed engines for war vessels, passenger steamers, &c. Messrs. Emerson, Walker, & Thompson Bros., Limited, are well supplied with orders for windlasses and other

specialities, and their works are kept fairly busy. At the establishment of Messrs. Carrick & Wardale the department for the manufacture of ships' pumps, is kept in steady operation. The Dunston Engine Works Co. have orders enough on their books to keep the boilermaking and other departments busy for some time to come. The firm have received an order to fit the ten Russian barges building at Messrs. Stephenson's Hebburn yard with the patent self-holding steering gear, of which they are the sole manufacturers. This gear is admirably adapted for vessels of a small type in which steam gears are not necessary, and their great popularity is evidenced by the fact that there are over 1,000 now in use on yachts, steam tugs, launches, torpedo boats, fishing vessels, barges, &c. The self-holding arrangement in the gear is its special feature; but it has other excellent qualities, and for a hand gear, seems to be everything that could be desired.

In the local ironfounding trade business is much worse than might be inferred from the state of work in engineering establishments. The exceptional dulness in this branch of industry is to some extent a consequence of the prolonged strike of last year. Local engineering firms were then forced to order their supplies of castings from Scotland, and the Midland counties of England, and they probably have discovered that they could get them cheaper in that way than if ordered on the spot. That, at all events, is the inference to be drawn from the fact that many firms still continue to draw a good part of their supplies from those distant centres; for it is not to be supposed for a moment that they would go to Scotland, or the Midlands for castings, if they could get them equally cheap here. The engineering firms, of course, are not at all to blame in this matter, for it is incumbent on every one nowadays to buy in the cheapest market; but the ironfounders should, in their own interest, take such steps as may be necessary to produce as cheaply as their distant rivals, and in this way keep the work in their own district.

Mr. W. F. Snowdon, the Newcastle agent for the sale of Morison's radial evaporator, has obtained several orders within the past few weeks for that well-known speciality. He has also had several important contracts for covering the boilers and steam pipes of steamers with non-conducting composition, and is likely to be very busy for some time with that class of work.

#### THE WEAR.

**Shipbuilding.**—Messrs. J. L. Thompson & Sons appear to be very far from having reached finality in improvements at their yard, for they are still busy in making alterations and putting down new plant. At present there is sufficient work in hand to keep the machinery going, and this—which, it may be said, is the normal condition at this establishment—is tolerably certain to be maintained during the remainder of the year.

The Strand Shipbuilding Co. have been successful against very active competition in getting an order for a Trinity House lightship, and at Messrs. Bartram & Sons' yard frame turning for a large vessel has been commenced. The latter firm have lately made an important addition to the area of their yard, and are now busily engaged in extending premises, putting down new plant, &c. When the alterations are completed there is no doubt that the productive capacity of the establishment will be much increased.

The outlook at Messrs. Austins' yard has improved greatly within the month, the construction of a good-sized vessel having been commenced, with the result that employment has been provided for a number of the hands who were idle. It is understood that the firm have orders for other vessels, and are likely to be busy for a considerable time to come. At Mr. Laing's yard the framing of a very large vessel has been commenced, and an appearance of greater briskness is consequently to be noted. The splendid steamer *Obra*, which was built by the firm for the British India Co., and launched on April 26th, left the port lately, her fitting-out and general equipment having been completed in a remarkably short time, and it is thought probable that another vessel of a similar type will shortly be put down at the Deptford yard.

Among recent orders for "turret" steamers, placed with Messrs. Doxford & Sons, are three, for a Sunderland, a West Hartlepool, and a Continental firm respectively. The whole of these vessels are to be of large size, and will be plated on the recently introduced "Joggle" system, which causes packing to be dispensed with, and give increased strength to the structure, whilst also adding to the carrying capacity. The firm launched on the 20th inst. the s.s. *Scottish Hero*, a vessel of the "turret"

type, ordered by a London firm, and of similar dimensions to the steamers *Turret Bay*, *Turret Bell*, and *Bencilife*. She will be fitted by the builders with quadruple-expansion engines, and water-tube boilers, to be supplied by Messrs. Babcock & Wilcox. It is understood that the keel for the vessel recently ordered by Messrs. Rudolph, Crow & Co., of Liverpool—which will be the largest cargo boat afloat—will be put down in the berth in which the *Scottish Hero* was built. The deliveries of material at the yard during the past few weeks have been unusually heavy, and present appearances indicate the existence of abundant work in the various departments of the establishment.

Messrs. Short Brothers are understood to have secured some orders lately, and the increased pressure of work in the yard is shown by the fact that a night shift has been commenced in the frame-turning department. This firm have—like others who are alive to the necessity of keeping abreast of the times—made important additions lately, both as regards premises and plant, with the result of largely increasing the product capacity of their yard. The firm have been brought into special prominence—locally at all events—by the presence of Colonel North, on the occasion of the launch of the s.s. *Avery Hill*, the second vessel built by them for the company with which Colonel North is identified in the development of the nitrate trade, and there is little reason to doubt that the valuable business connection they have, in this instance, succeeded in forming, will prove of great advantage to themselves and to the port in the future.

Messrs. John Priestman & Co. obtained orders for three vessels early in the month, two of them having a carrying capacity of 5,000 tons. The work on one of these vessels has already been commenced, and a berth is being prepared for another. The yards on the Wear that have not been specially referred to are in every instance short of work, though reports of coming improvement as regards one or two of them are current.

By the time this is in print an important delivery of new plant, consisting of pumps and gas engines, will have been made at the South Dock for the equipment of the Wear Commissioners' No. 2 graving dock. This outfit of machinery was ordered some months ago from Messrs. Tangyes, Limited, Birmingham. We hope to give particulars of it in a future number.

**Engineering.**—Among the vessels recently engined at the Palmer's Hill Works were the s.s. *Novembre*, built by the Tyne Shipbuilding Co., and s.s. *Pacific*, built by Messrs. J. L. Thompson & Sons. During the past few weeks the works have not been particularly busy; but this is scarcely to be wondered at, considering the general dulness in shipbuilding. It is hoped that the normal state—which is one of full employment in all departments—will soon again be established, and as indicative of that, it may be stated, that the space recently added to the boilershop is already beginning to be utilised. At the North-Eastern Engine Works, South Dock, business is fairly good, but at the Scotia Works (W. Allan & Co.), comparative slackness exists. The s.s. *Avery Hill* is receiving her machinery at the Southwick Engine Works, where there is a fair amount of work in hand. In the local iron foundries dulness is still the prevailing feature, but forges are beginning to show improvement. There is also an appearance of improving business at the Monkwearmouth Iron-works.

**The Hartlepoons.**—Both the leading shipbuilding firms at this centre are reported to have booked orders lately, and the initiatory departments in the yards are already showing signs of increasing work.

The Hartlepool firms have undoubtedly kept in the front rank so far as regards improvements in plant and general working appliances—their remarkable success in obtaining orders—even when the industry in other districts is at the extreme of slackness—is therefore not to be wondered at. The facilities for carrying out repair contracts at the port are exceptionally good, and the amount of work in this line that is annually secured by local firms is very considerable. At the present moment all the firms have more or less repair work in hand in addition to the new work, and employment for operatives is consequently much more plentiful than it was some little time ago. In the engineering establishments considerable briskness still exists, and at both Messrs. Richardson's and the Central Marine Works a good many vessels have been fitted with machinery during the past couple of months. At the docks, work in connection with timber discharging and stacking is abundant; but there is little doing at the coal staiths, and for some time past shipments have been small.

**Stockton.**—There is little change to note in the state of work

at the shipbuilding yards since last month, only Messrs. Ropner's establishment as yet showing much evidence of activity. The engineering works of Messrs. Blair & Co. are kept fairly busy, full complements of hands being employed in the various departments. During the present month the large steamers *Eddystone* and *Fernfield* have been supplied with machinery at the works, the engines and boilers of the last-named vessel, which was built at Hartlepool for London owners, being of massive design and large power. Several successful trial trips of steamers engined at the works have taken place during the past two months. Bridge building and boiler-making establishments are, on the whole, fairly well employed, while in one or two of the local steel works business is brisk.

**Middlesbro'.**—It is stated that some additional orders of importance have been secured by shipbuilders at this centre, and a brisker time is being looked forward to. Business in the finished iron trade is still dull, but some improvement is noticeable at the steel works, and better time is being worked. Present prices of steel plates and steel angle bars are £4 15s. and £4 12s. 6d. per ton, respectively, less 2½ per cent. The output of Cleveland pig-iron will be reduced by 2,000 tons per week for some time, owing to an accident which has caused the stoppage of four blast furnaces, in addition to serious loss of life and destruction of property.

**Darlington.**—At the Darlington Forge Co.'s works the state of business remains very satisfactory, there being two shifts of men in the machine shop, while double shift is also being resorted to in other departments. A large proportion of the work in hand at this well-known establishment consists of stern frames, rudders, and other ship accessories. We understand that a 30 H.P. Crossley gas engine has lately been put down at the local railway engineering shops.

### THE MERSEY.

(From our own Correspondent.)

ALTHOUGH there are reports of a decidedly better state of things in other marine centres, no appreciable improvement can as yet be reported in this district and there is practically little or nothing new to note since last month, except that Messrs. Laird Bros., of Birkenhead, have received orders from the Admiralty for four torpedo-boat destroyers, but with regard to commercial work there is very little enquiry at present. As to general engineering, a slow but steady improvement is going on throughout the district and although it is still exceptional where establishments are what may be termed full of work, orders in most departments are coming forward more freely than they have been doing for a considerable time past. Stationary engine builders are nearly in all cases well supplied with orders for some time to come, boiler-makers are gradually getting better off although they are still as a rule but moderately engaged, machine tool makers are generally fairly well employed, and in this branch of trade there is a good prospect as regards work in the future. The returns of the trades union organizations continue to show a steady decrease in the number of out-of-work members, and although in this immediate district improvement in this direction has not been so marked as in other industrial centres, there being still 7½ per cent. of the local membership on donation, generally throughout the organization there are not more than 6 per cent. of out-of-work members on the books. In the Steam Engine Makers' Society the average of out-of-work members has fallen to between 3 and 4 per cent. of the total membership, which is less than it has been for the last three or four years.

Messrs. G. Birch & Co., Salford, are bringing out several improved designs in wheel-cutting machines and other special tools. In the wheel-cutting machines the principal feature aimed at has been to obtain both increased accuracy and speed of working, and an arrangement has been designed for enabling the workman to cut to the exact depth of pitch he may require, without any of the usual measurements being needed. This is effected by having a graduated disc which at one side is marked to thousandths of an inch and can be still further sub-divided if required, whilst on the other side sixty-fourths are marked, which are probably better understood by the ordinary workman. All the workman has to do on starting to any required depth of cut is first to set the disc to zero, then tighten up the disc, place his tool close up to the work and turn the disc round to indicate

the exact depth he has to cut. After this, the machine works with exactitude to whatever cut it has been set to, without any other measurements being taken. The firm are also bringing out an improved design of lathe to meet the requirements of some branches of electrical work where frequent changes from hand to slide rest are necessary, these operations involving considerable labour and great waste of time. In the lathe which Messrs. Birch have specially designed, the hand and slide rests are connected on a slide in front of the bed of the lathe, and when it is required to change from one to the other this is done by simply manipulating a handle, the change being effected in a few seconds instead of occupying one or two minutes as in ordinary lathes, and to set the work in hand the distances are readily disposed by means of a connecting link.

Mr. J. H. Widdowson, of Britannia Works, Ordsal Lane, Salford, Manchester, has just brought out an improved tube and plate tapping apparatus, which quite displaces work of this description done by hand. One of these new machines was a short time back supplied to the Chatham Dockyard on trial, and in their report the officials state that "the trial taps have been in continuous use for sixty days, tapping holes in the tube plates of boilers for the new cruiser *Minerva*, and they are considered to be an unqualified success; 1,280 holes have been tapped with the one set of taps and the taps are still in good condition. There is no difficulty in applying the apparatus and the threads formed by it are quite equal to those produced by ordinary taps, and have the additional advantage that those in the back plate are continuous with those in the front plate." It may be added that this apparatus which entirely supersedes the old method of cutting and piercing the bar to suit the different length of boilers, is made with taps 2½ in. to 4 in. diameter arranged to move every 3 in., the taps always being in pitch, ranging from 4 ft. 6 in. to 8 ft. over the tube plates.

Messrs. Fletcher, Russell, of Warrington, are introducing a very handy set of specially designed gas furnaces suitable for various engineering and workshop requirements. These are constructed of fire-clay, and strongly bound with plate iron, and wrought iron strengthening bands, to stand rough usage in the workshop. The furnaces are supplied with a special form of gas burner, arranged as a blow-pipe but so designed as to reverse the action of the ordinary blow-pipe. This burner consists of an outer chamber into which the gas is led and an inner chamber through which the air passes, both mingling at the outlet and a very high temperature bushy flame is given off. The special feature of the burner is the respective area of the inlets for the air and gas, the area of the air inlet being in the proportion of from three to four of the gas, whilst in the old blow-pipes it is just the reverse. With this altered construction an equally high temperature flame can be got with a lessened pressure of air, and the special advantage gained is that the air pressure can be used from a fan or a high-power blower, whilst it is not liable to light back, and the burner can be easily and cheaply replaced, whilst the flame is free from the local and cutting action which is found in the ordinary blow-pipes or gas burners. Furnaces for melting purposes are made in various sizes with crucibles for melting from 28 lbs. up to 1 cwt. of ordinary pig-iron, the smaller quantity being melted in about 70 minutes and the larger in about four to five hours, the larger furnaces having not yet been tested sufficiently to enable a more exact time than this to be given.

In the iron trade only a slow business has been put through during the month, the holidays having of course interfered with business operations, whilst apart from this there has been a falling off in the weight of business doing, at any rate so far as pig-iron is concerned, merchants and consumers being apparently well bought for the present. Makers being pretty well sold, hold firmly to their quotations, but secondhand holders here and there are prepared with concessions. Local pig-iron makers still quote about 40s. to 42s. 6d. less 2½ for forge and foundry delivered Manchester, whilst for district brands makers are still holding to about 37s. 6d. for forge and 39s. for foundry as the minimum for Lancashire, with foundry Derbyshire quoted 44s. up to 45s. net cash delivered Manchester. Outside brands have fluctuated somewhat in price, but Middlesbrough is not now quoted under 43s. 10d. for good foundry qualities net cash delivered Manchester, with 8d. more being asked in some cases. Eglington now averages about 45s. 6d., Gartsherrie, 48s. 6d. and 49s. net prompt cash delivered Lancashire ports.

In manufactured iron makers have been securing more business than they had been doing and are now fairly well sold for

the present, with a firm tone in prices. Lancashire bars could only in exceptional cases be bought at £5, the general quotation being £5 2s. 6d. with Staffordshire bars £5 2s. 6d. to £5 5s.; sheets average £6 15s. to £7, and hoops £5 15s. to £6 for random and special cut lengths delivered Manchester district, with 2s. 6d. less for shipment.

In the steel trade only a moderate business has been stirring with prices at the close of the month rather lower than these last given. Hematites average 52s. to 53s. for good foundry qualities, less 2½; steel billets, £4 for common to £4 5s. for better qualities, net cash, and boiler plates £6 delivered Manchester district.

In the metal market business has been slackening off during the last few weeks, buyers holding back in the expectation that the recent advance on list rates for manufactured goods could scarcely be maintained in view of the giving way in raw material, but so far there has been no alteration in list rates which remain as under:—Solid drawn brass boiler tubes, 6d.; brass surface condenser tubes, 6d.; copper tubes, 7½d.; brazed copper gas and steam tube, 7d.; brass wire, 5½d.; copper wire, 6½d.; rolled brass, 5½d.; sheet brass, 6½d.; yellow metal bolts, 5½d.; wrought copper boat nails and rivets, 8½d. per lb.; and copper bolts, £58 per ton.

In the timber trade imports have not been heavy and deliveries have been about an average. Values are low, but a somewhat better feeling prevails. In East India teak, with large arrivals of logs and planks, prices have declined, although there has been a fair enquiry. A cargo of greenheart has arrived. There has been a fair consumption but stocks are ample and prices unchanged.

In the coal trade a depressed tone continues with pits, which of course made the usual holiday stoppages, now working not much above half-time. List rates are nominally unchanged, but in the open market low prices are taken on orders of any weight. House fire coal is in the slowest possible demand, whilst the lower qualities of round coal suitable for steam and forge purposes are difficult to move owing to the excessive supplies. The limited supplies of engine fuel move off freely at full rates. At the pitmouth best Wigan Arley is quoted 10s. to 10s. 6d.; seconds Arley and Pemberton four foot, 8s. 6d. to 9s.; common house coals, 7s. 6d. to 8s.; steam and forge coals, 6s.; engine fuel, 8s. 6d. and 4s. for common to 4s. 6d. and 5s. for better qualities. Only a small business doing for shipment with low prices ruling, 7s. 6d. being now about the average figure for ordinary steam coal, delivered at the ports on the Mersey.

## NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

**Barrow.**—No new orders have been booked in the shipbuilding and marine engineering trades of Barrow during the past month, save one or two good repair orders which are receiving attention. It has now been fixed that the launch of H.M.S. *Powerful*, first-class cruiser, shall take place on the morning of July 24th. The christening ceremony will be performed by the Duchess of Devonshire, whose husband is the noble chairman of the Naval Construction and Armaments Co., Limited. The *Powerful* is the biggest ship ever built at Barrow, and the occasion of her launch will be made the occasion of a public holiday in the town, and a vast concourse of people is expected, not only from the immediate districts, but from points which can be reached by steamboat traffic. Preparations, in which the greatest care is being taken, are being made to secure a successful launch. The big ship will represent a deadweight on her ways of nearly 7,200 tons, but there is no difficulty in dealing with so great a weight at the Barrow yard, because it is so firm and solid, and admits of a very satisfactory declination ensuring easy way for a released vessel, while Walney Channel, which is a mile wide, gives ample scope for free launching. The work in constructing the *Powerful* is proceeding very satisfactorily, and it is evident by the time she is launched and brought into the docks under the 100 ton hydraulic crane, her engines will be ready to drop in her hold, as well as a considerable proportion of her 48 Belleville boilers. The *Juno* and *Doris*, second-class cruisers, are making good headway, and one of these at any rate will not be long after the *Powerful*, before she is ready for launching, and for the machinery which is to drive them. The sand dredger for the Mersey Dock Board is

engaging much attention in the building department. She is a most complicated piece of workmanship, and possesses a vast detail of mechanical and engineering skill, as may easily be understood when it is remembered she can pump 3,000 tons of sand in three-quarters of an hour. Of course, most of the work of her construction is of an engineering nature, but there is a lot to do in the naval architects' department as well. Other work is now urgently needed in the Barrow yard as many men employed as ironworkers, moulders, smiths, &c., are being paid off owing to there being no new orders on which they can engage their attention. It is hoped Barrow will be able to secure some new work in the year's Naval Programme, and it is also believed that Barrow builders will secure one or two orders for the ordinary Mercantile Marine which are in the market, although prices are so low that they afford no margin for profit. Indeed, to secure some of the few orders offering makers have to face a loss, and this they are not prepared to do. The strikes at the Barrow yard have all been settled except that of the drillers, who are still out. Their places have, however, been taken by other men, and the drilling work which has to be done in the yard is growing less and less. The torpedo boat *Sturgeon*, built at Barrow, has passed her Admiralty trials on the Clyde, steaming easily 27 knots for three hours together. This torpedo boat has steamed when pressed 29 knots an hour easily. The *Skate* and *Starfish* are expected to take their trials during July, and will attain the required speed easily.

**Whitehaven.**—There is a revival of the attempt several times previously made of resuscitating the shipbuilding industry at Whitehaven. Some years ago, when it was necessary on legal grounds to wind up the Whitehaven Shipbuilding Co., Limited, the yard was purchased by the Earl of Lonsdale, the lord of the manor, at a very cheap price, with the view of being able to dispose of it on favourable terms to any shipbuilder or company who were anxious to start business in a small way. Such a yard on the West Cumberland coast would be advantageous from a repairing point of view pure and simple, and there is reason to believe the yard could be fairly employed in the construction of sailing ships up to 3,000 tons, or steamships of equal size which could either be engined elsewhere, or the work undertaken by the Lowca Engineering Co., whose works are within easy distance of the site of the yard. The proper way to start in the revival of the shipbuilding industry of Whitehaven is for the lord of the manor and the local capitalists to get together, engage a capable manager, and then solicit outside assistance which would doubtless be forthcoming.

**Workington.**—There is a steady business doing in shipbuilding at Workington. Messrs. Williamson & Son have never many orders in hand but they keep their yard regularly going, and turn out a few ships every year which are either built to order or readily sold when they are built. During the month they have launched an iron barge from their yard named the *Shark*, which has been built for Messrs. Roe & Co., Liverpool, for river work on the Mersey. Her dimensions are:—Length, 100 ft.; beam, 24 ft.; depth, 7 ft. 6 in.; carrying capacity, 300 tons on 5 ft. 6 in. draft. Messrs. Williamson & Son have also an order from Messrs. Lage & Co., Rio Janeiro, for five barges, two of large and three of small dimensions. The former will carry 500 tons, and the latter 100 tons. There is, therefore, a prospect of good steady work at the Workington yard during the next six or nine months at least.

**Maryport.**—The shipbuilding trade of this place may be reported steady but not brisk, but Maryport is not one of the places where trade is now brisk and then quiet. There is a steadiness in shipbuilding in West Cumberland, which is quite at variance from the trade in the rest of the country because if orders are not to hand builders know the type of ship that is required by trade, and they find capital for it when it is built. There are prospects of a fair business in sailing craft at Maryport for some time to come, and it would not be surprising if some day or other when in the natural course of things the steel makers of West Cumberland begin the manufacture of plates and shipbuilding sections, there is a marked development of the shipbuilding industry on the Solway.

**Lytham.**—The development of Preston as a port, and the successful efforts which are being made to make the Ribble a navigable river are likely to lead to interesting developments in the shipbuilding industry of this place. The news is to hand that orders which include two handsomely appointed passenger steamers for foreign traffic have been placed with the Lytham shipyard, which will keep the large number of hands employed

at work for some months to come. These steamers will be of small tonnage, but they mark a new departure in the work done on the Ribble. The enterprise, however, which has created the port of Preston may reasonably be expected to concentrate itself on the subsidiary industries which always are to be found where shipping congregates. Iron and steel can be cheaply delivered on the Ribble, and there is plenty of coal within easy and cheap reach. Further than this, there is a wealthy commercial population in the vicinity of the river, and they will not allow a chance to pass them by of profitable business.

**Shipbuilding Material.**—There is but a quiet demand for shipbuilding material of all descriptions, but the mills at Barrow are fairly well off for orders, and it seems probable from present prospects that new orders will be required to supplement those already held, before deliveries have been fully completed. The mills at Barrow have been stopped nearly a fortnight during the month in consequence of the breaking of one of the housings of the heavy mill. The stoppage of this mill meant, of course, the stoppage of the new and lighter mill which has recently been profitably employed in the production of light plates. Both mills are, however, again in full operation, and makers are likely to maintain this activity for some time to come. Prices remain low at about £4 12s. 6d. per ton for heavy plates. The statement made some time ago that there was a prospect of the Barrow Steel Works closing has received its denial in a very gratifying way, as the company has recently issued a prospectus for new 5 per cent. debenture stock to take the place of the existing debenture bonds, and there has been a very full request for it. The company is gradually modernising its plant, and every effort will be made to complete such arrangements with railway companies, royalty owners and others who represent items of cost so that trade can be profitably carried on. It would be a serious blow to the shipbuilding industry at Barrow if the steel works were closed, as it would militate against the former getting cheap deliveries of material, not that Barrow makers are cheaper than others, but because their existence within a mile of the shipbuilding yards helps the latter to get cheaper deliveries from elsewhere.

**The Hematite Trade.**—There is only a quiet business doing in the hematite pig iron trade, and the inquiry from all sources is only barely sufficient to consume the make of the 30 furnaces out of 75 which are in blast. Most of the iron produced is of the Bessemer class, and next to no trade is doing in forge or foundry qualities of metal. Prices are easy at 48s. 7d. per ton net cash sellers, and 49s. 6d. buyers, while makers ask 44s. 6d. for mixed Bessemer numbers, and for some special brands 46s. per ton net f.o.b. Stocks are 40,000 tons higher than they were at the beginning of the year, and trade prospects are no better than they were then.

## BELFAST TRADE NOTES.

(From our own Correspondent.)

THERE is not much new to report in this flourishing district, the activity in all branches is maintained and the outlook of the brightest description, the launches since my last Notes amounted to two, the *Statesman*, for Messrs. Harrison's (Liverpool) fleet, and the *Ardandearc*, for Messrs. Clark & Service, of Glasgow, both from the yard of Messrs. Workman, Clark & Co.

Messrs. Harland & Wolff should have launched the large cargo steamer they are building for the White Star Line last month, but owing to her great depth and draught of water they had to wait for an extra high tide. In all probability she will be launched by the time this reaches our readers' hands. Her name has been changed since my last mention of her, the *White Star* evidently did not care for *Vordic*, as they have changed it to *Georgic*. She looks an enormous size as she lies on the slip, and when we come to take her length, which is only 20 ft. shorter than the *Teutonic*, the largest ship afloat after the *Campania*, it gives one a fair idea of her size. The *White Star* Co. are evidently going to make a good show for first place on the Atlantic cattle trade.

Alongside the *Georgic* there is another large steamer in an advanced state, named the *Victorian*, for Messrs. Leyland & Co., of Liverpool, for their Atlantic cattle trade. She is similar to the *Lancastrian* and *Philadelphian*, built in 1891 by Messrs. Harland & Wolff for Messrs. Leyland, and which have been doing splendid work on the run between Liverpool and New York. The *Victorian* will be launched shortly after the *Georgic*, and is sure to prove a worthy companion to her predecessors. Mr. Pirie, one of the partners of Messrs. Harland & Wolff,

Limited, speaking at a dinner given in honour of Mr. A. L. Jones, of the firm of Elder, Dempster & Co., Liverpool, on Wednesday, June 12th, said, in proposing the toast of Liverpool Shipping, that he was glad to be able to take a hopeful view of the prospects of the interests in which they are so deeply concerned—Liverpool shipping. He said that his own firm had in the course of construction for Liverpool firms no less than five steamers considerably over 500 ft. long, and several others over 460 ft. long. These facts, also, he thought, confirmed his opinion that a steady improvement was contemplated by many, notwithstanding that the dark clouds on the commercial horizon had not been altogether dispelled. Remarkable as these statements were, they merely served to show that the same spirit of progress which inspired the leading men of Liverpool in the past animated them still. And as an instance of what had been accomplished hitherto by this progressive, and what we might call truly British, spirit, the steamers already constructed by his firm alone for one of their large companies in Liverpool (the *White Star* Co.) amounted to no less a number than 34 measuring about 155,000 tons, and for these steamers, which had all been built in Belfast, this company paid his firm upwards of £4,000,000. He might also mention that for the original firm of Messrs. Bibby (who were practically the means of his firm becoming so closely connected with Liverpool shipping interests) and Messrs. F. Leyland & Co. they had built 31 vessels, measuring about 112,000 tons, for which they had paid them about two and a quarter millions, and he was sure it was hardly possible for them to conceive the fact that for several other Liverpool shipowning firms and companies, such as the *African Steamship Co.*, in which their guest played such a conspicuous part, Messrs. Bates, Messrs. Brocklebank, the *Pacific Steam Navigation Co.*, they had built 100 vessels of an aggregate tonnage of 320,000, for which they had paid £5,000,000. They would thus see that Liverpool shipowners, in pursuance of the policy that made them famous for enterprise and commercial progress, had obtained from his firm 165 vessels within a comparatively short period. This fact, together with their having paid for them about £12,000,000, would enable them to realise the close connection that existed between Belfast and Liverpool, and he presumed this was the reason why he had been asked to propose the toast of "The Shipping Interests of Liverpool." He need hardly say any more to assure them of his personal interest in the welfare of the port of Liverpool, and especially the shipping trade, and he knew he was only echoing the sentiments of every citizen of Belfast in wishing their Liverpool friends continued and increasing prosperity.

The fine steamer *Oroya*, of the Orient Line, which recently went ashore at Aden, arrived here on 24th May and was docked in the Alexandra Graving Dock by Messrs. Harland & Wolff for repairs, the damage is not so extensive as was at first thought, and indeed the condition of her bottom after being on the rocks so long speaks well for her builders (the Barrow Co.). The necessary repairs will be executed with all despatch as the company's service will naturally suffer by her absence.

Messrs. Harland & Wolff had also the s.s. *Davaar*, belonging to the Campbelltown Steam Packet Co., which went ashore on Briggs Reef on the co. Down coast, when on a voyage from Campbelltown to Belfast with an excursion party, in for repairs. The damage was not serious and the vessel was able to proceed to her station after three days' detention in dock.

Messrs. Workman, Clark & Co., Limited, of the Belfast Shipyard, launched, as previously stated, on Saturday, May 25th, the *Statesman*, a large steamer built to the order of Messrs. T. & J. Harrison, Liverpool. Her dimensions are 450 ft. by 52 ft. 6 in. by 33 ft. 6 in., and her gross tonnage is about 5,000, and she will carry over 9,000 tons deadweight; triple-expansion engines of the latest type are fitted by builders and two extra-large boilers, capable of giving over 3,000 I.H.P. The vessel is fitted with manganese bronze propeller, and will have four pole-masts, and all the latest improvements for the rapid handling of cargo.

Messrs. Workman, Clark & Co. also launched from their south yard during the month the s.s. *Ardandearc* for Messrs. Clark & Service, of Glasgow. She is similar to the s.s. *Ardanross* and *Ardandhu*, built by them in 1892 for Messrs. C. & S. Her gross tonnage is about 2,500, and she will be fitted with triple-expansion engines of 1,800 I.H.P., and her boilers will have Howden's system of forced draught; the masts are telescopic to enable her to pass under bridges such as those on the Manchester Canal, etc.



Messrs. Workman, Clark & Co. have the fine four-masted ship *Dondonald*, which they built in 1892 for Messrs. T. Dixon & Son, of Belfast, in for repairs. Besides the order mentioned last month as having been placed by Messrs. Holt, of Liverpool, with Messrs. Workman, Clark & Co., they have been entrusted with two others during the month. The largest one will be engaged in the China trade and the two smaller ones in the Straits Settlement service. The *Germanic* has been doing good work since she left Belfast early in May; she did the run from Queenstown to New York in 7 days 4 hours—a splendid performance for a ship of her age, after being re-engined, on the home run she reduced that to 7 days some odd minutes, which is 4 hours better than the great new American liner, *St. Louis*, a boat of 20,000 H.P. When the *Germanic* has only about 6,000 H.P., it speaks well for her builders that a boat 20 years old, after being re-engined, is able to beat one built at the present time as a flyer. I wonder what the Americans will think of this? It strikes me they have a lot to learn in shipbuilding yet, and had better come over and get a few lessons. The *Oropesa*, belonging to the Pacific Steam Navigation Co., and whose trial we reported in our March number, has also proved in every way a credit to her builders. She arrived at Liverpool at end of May, after having performed a very creditable maiden voyage. Leaving Liverpool on March 1st, she performed the double journey, to and from Valparaiso, in 81 days, breaking all records. This includes 12 days' detention at Valparaiso and two days at Sandy Point.

### LEITH STEAM YACHTING NOTES.

**D**URING the fitting-out season which is now drawing to a close, the Queen's Dock in Leith has been a scene of great activity caused by work going on among the large number of steam yachts of various tonnages, which have been, and are at present, being made ready for sea.

Prominent amongst them during the last few weeks has been the big American s.y. *Margarita*, 703 tons, sent by her owner, Mr. A. J. Drexel, straight to Leith from the Mediterranean to be refitted from stem to stern by her builders, Messrs. Ramage & Ferguson, Limited.

Another Mediterranean cruiser, the *Elida*, 360 tons, belonging to Mr. James Currie, has been docked and overhauled generally, while her owner accompanied the Commodore of the Royal Forth Yacht Club, Sir Donald Currie, M.P., on a cruise to the opening of the Baltic Canal, in the R.M.S. *Tantallon Castle*.

The new s.y. *Lady Sophia*, 300 tons,—owner, Mr. Robertson, of Wansley Hall, Peterborough, had her trial trip on June 18th last.

Mr. Alec Brown's new 20-ton steel steam yacht is plated, and decks laid ready for launching before the end of last month.

Amongst other yachts which have fitted out during the last season at Leith may be mentioned the s.y. *Catarina*, 587 tons y.m., the Earl of Carnarvon; s.y. *St. Elean*, 283 tons, Colonel Henry Platt; *La Belle Sauvage*, 743 tons, Mr. Robinson, of South Africa; s.y. *Hersilia*, 428 tons, Dr. Hutchinson; *Speedy*, 140 tons, Baron Barreto; *Vigilant*, 185 tons, The Scottish Fishery Board; *Carlotta*, 104 tons, Mr. H. Blake; *Tourmaline*, 170 tons, owner, Mr. Leyland, of Haggerston Castle, Northumberland.

The presence of so many steam yachts in Leith is a proof, that the unrivalled conveniences for executing work to owners' satisfaction are appreciated, and that in future yachtsmen may patronise the port more than ever.

As regards new vessels, Messrs. Ramage & Ferguson, Limited, are laying the keel of a 500-ton three-masted auxiliary steam yacht for a well-known American yachtsman, also that of a new 720-ton fast steam yacht for Sir Donald Currie, M.P., to be finished in time for the next Mediterranean season.

This fine yacht, which will be flagship of the Royal Forth Yacht Club, is to be built much in excess of Lloyd's requirements, with teak decks fore and aft, while her fittings and equipment will be of an unusually fine description.

As regards yachting generally on the Firth of Forth, it may be mentioned that nearly all the sailing division of the R.F.Y.C. and other clubs, are in full commission, and that the principal regatta took place on June 22nd last.

**New Contracts.**—Messrs. Ramage & Ferguson, Limited, Leith, have contracted to build an auxiliary steam yacht of 500 tons, and a full-powered steam yacht of 708 tons, also a cargo steamer for Thos. Cowan, Esq., Grangemouth, to carry over 1,200 tons deadweight.

### Miscellaneous.

**Beverley.**—On Monday, June 24th, Messrs. Cochrane and Cooper launched from their yard, at Grovehill, Beverley, a new steam fleeter, which has been built to the order of the Hull Steam Fishing and Ice Co., Limited, and is of the following dimensions:—98 ft., by 20ft. 6 in., by 11 ft., and is to be fitted with triple-expansion engines of 35 N.H.P., by Messrs. Amos & Smith, engineers, Hull. The vessel will be fitted up with all the latest improvements for trawling. On leaving the ways the vessel was christened the *Wales* by Mrs. Newbald, of Beverley.

A Sectional Marine Boiler has been provisionally patented by Mr. W. H. Wilson, 191, Waterloo Square, Camberwell Green, London, S.E., which combines the principle of water-tubes arranged over an ordinary furnace, and a cylinder through which numerous fire-tubes are passed. The invention also provides automatic closing valves for the ends of the several sections of water-tubes, so that any water-tube may be ruptured without much escape of steam or loss of pressure; other important features are also introduced. The products of combustion first circulate between the rows of water-tubes, and the partly cooled gases then pass through the smoke-tubes in the cylinder, which abstract the remaining effective heat. This plan is expected to make the boiler one of the most economical in fuel yet brought out, and to avoid over-heated fire-tube ends. There is also a large water surface and steam space, and, being in sectional parts, the cylinder and other sections can be passed through the hatchways for erection in the hold of the vessel without trouble. The height from floor to top of cylinder is about two-thirds the height of ordinary return tube shell boilers. The above features should recommend this boiler to shippers and others. Further particulars may be obtained by addressing the inventor.

**Presentation of the Royal Humane Society's Medal to Mr. R. Morrison.**—On Thursday evening, June 6th, Mr. R. Morrison, chief engineer on s.s. *Celtic King*, was presented with a medal awarded to him by the Royal Humane Society for an act of bravery, resulting in the saving of life last December. The presentation was made by Mr. Bedell, representing the owners of the *Celtic King*, and to whom the medal had been forwarded for presentation. The ceremony was held in the premises of the Institute of Marine Engineers, 58, Romford Road, Stratford, granted for the occasion by the office bearers and Council of the Institute, a fitting place for such an event. Mr. Jas. Adamson, the Honorary Secretary of the Institute, opened the proceedings by briefly intimating that in the name of the Council and the Institute he was much pleased to welcome the company which had assembled to do honour to one of the members for an act of heroism and devotion, the details of which he would ask Captain McGibbon to lay before them that they might the more appreciate what had been done, expressing at the same time the hope that amid the hard turmoil and keen competition, the harassments and anxieties of business now-a-days, the finer qualities of manhood, as exemplified by the act of Mr. Morrison, might never sink, but be ever present and ever admired. Captain McGibbon then read the letter he had addressed to the Secretary of the Humane Society, urging the claims of Mr. Morrison as worthy of recognition by the Society, and setting forth that in the early morning of December 1st, when hauling out of the Royal Albert Dock into the Thames, a man fell off the pier-head into the river; his cry was heard by Mr. Morrison, who jumped into the water and seized the struggling man, around whom he attached a rope, and by which he was hauled on board. Mr. Morrison, while being hauled on board himself, was compelled to drop into the water again by reason of his hands being torn against the plates. He, however, seized another rope which was flung to him, and was got on deck after being in the water a considerable time. Captain McGibbon continuing, said he felt proud of his chief engineer, and was highly pleased to have the opportunity accorded him within the premises of the Institute of Marine Engineers of saying so, under the pleasing circumstances surrounding them. Mr. Bedell then presented the medal, which was a very handsome one, inscribed with a suitable inscription, and an address to Mr. Morrison, accompanying the presentation with a few appropriate words. Mr. Morrison briefly acknowledged the compliment, and the proceedings closed with a vote of thanks to the Council and the Hon. Secretary for the use of the premises and making the arrangements which had been so expeditiously and pleasantly carried out.



## LAUNCHES AND TRIAL TRIPS.

## LAUNCHES—ENGLISH.

**Blaamanden.**—On May 24th Messrs. Ropner, of Stockton-on-Tees, launched a steel screw steamer, the dimensions of which are as follows, viz.:—Length, b.p., 325 ft.; breadth, extreme, 43 ft.; depth, moulded, 28 ft. 3 in. The vessel has been built to the order of a Norwegian firm, and has been designed to carry a deadweight cargo of 5,060 tons on Lloyd's summer freeboard. The steamer will be fitted with triple-expansion engines, having cylinders 23 in., 89 in., and 64 in. by 42 in. stroke. The steamer was christened *Blaamanden*.

**General Havelock.**—On May 25th a steamer was launched by Mr. James Laing, at Sunderland. The new vessel has been built for Messrs. R. M. Hudson & Sons, and is intended to replace the *General Havelock*, which was lost at Ryhope in autumn last. The passenger service to London from Sunderland has been suspended since the loss of the last-named boat. The old vessel, it may be of interest to mention, was 190 ft. in length, 26 ft. 3 in. in breadth, and 14 ft. 4 in. in depth, while the new vessel is 209 ft. length over all, 28 ft. in width, and 17 ft. 7 in. in depth from the main deck, or 23 ft. 1 in. to the poop deck. The engines have been constructed by Messrs. George Clark, Limited, at Southwick, and will consist of a set of triple-expansion engines of 19½ in., 30 in., and 50 in. cylinders, with a stroke of 36 in. She was christened the *General Havelock*. Captain Stock, the master of the last *General Havelock*, will command the new vessel.

**Dione.**—On May 25th a wooden schooner, of about 102 tons, named the *Dione*, built by Messrs. Cook & Son, at Appledore, was launched, owned by Messrs. Cook & Son, of Bideford.

**Pelican.**—On May 25th an iron steam ketch, of about 150 tons, named the *Pelican*, built by Messrs. Cook, Welton & Gemmell, at Hull, was launched, owned by the St. Andrew's Steam Fishing Co., Limited, of Hull.

**Queenst.**—Mr. H. Scarr has lately launched at Beverley a coasting steamer, built of steel, to the order of Messrs. Matthew Jackson & David Cook, of Louth and Hull. Dimensions:—Length, 74 ft.; beam, 15 ft.; depth, 8 ft. The vessel was named the *Queenst*. Messrs. Escreet & Richmond, of Hull, will supply the engines.

**Monsoon.**—On May 25th Messrs. Day, Summers & Co., of the Northam Iron Works, Southampton, launched the new steel steam yacht *Monsoon*, which they have designed and built for Lieut. W. N. Diggle, R.N., late owner of the auxiliary schooner yacht *Monsoon*, of 280 tons, which yacht was also built by the firm. Mr. Diggle's new yacht is much the same class of vessel as the *Lantana* and *Ladye Maury*, both of which yachts were designed and built by Messrs. Day, Summers & Co., she is, however, rather larger than either of these vessels, her dimensions being as follows:—Length for tonnage, 139 ft.; length on load-water line, 129 ft.; breadth, extreme, 19 ft. 2½ in.; depth at centre, from top of keel to deck, 12 ft. 6 in.; tonnage, y.m., 235. The yacht will be fitted with Reid's steam steering gear on bridge and Reid's steam windlass and electric light throughout. The anchors are Thomas & Nicholson's patent. The machinery is of the compound surface-condensing type, designed and constructed by the firm, the cylinders of the engines being 15½ in. and 30 in. diameter, by 23 in. stroke, working pressure 100 lbs.; the boiler, which is an extra large one, is 10 ft. diameter and 9 ft. long. The yacht and machinery have been built to Lloyd's highest class under special survey.

**Screw Passenger Steamer.**—On May 27th Messrs. Allsop & Co., Limited, launched from their yard at Preston, a steel twin-screw passenger steamer, of the following dimensions:—Length, 87 ft.; breadth, 15 ft.; depth, 6 ft. 9 in., on a draught of 3 ft. 6 in. Built under Board of Trade inspection to the order of the Preston Steam Packet Co., Limited, of Plymouth. She will carry about 800 passengers, and steam 11 to 12 knots. The engines, etc., are built by the same firm, and will develop about 200 H.P., working at 100 lbs. pressure.

**Imerina.**—Pensador.—On June 6th Messrs. John Jones & Sons, of Liverpool, launched the stern-wheel steamer *Imerina*, built for French owners. She went on her trial trip, and was afterwards taken asunder, and on the 8th was shipped. —On June 8th they also launched the twin-screw steamer *Pensador* for the Amazon river navigation, a vessel of fair speed with a small consumption of fuel. The general design and

arrangements are specially adapted to the trade for which she is intended.

**Avery Hill.**—On June 6th there was launched from the Pallion shipyard, at Sunderland, a new steamer, named the *Avery Hill*, which has been built for the Nitrate Producers' Steamship Co., of London, with which Colonel North is largely identified. This vessel is 351 ft. long, 42 ft. beam, and 28-15 ft. moulded depth. Her gross tonnage is 8,300, and her net registered tonnage 2,100. Her deadweight carrying capacity is 5,180 tons. She is built of steel, to the highest class of Lloyd's registry. The engines will be put on board by Messrs. George Clark & Co., and will be of the triple-expansion type, with cylinders 24½ in., 40 in., and 66 in. diameter, and a stroke of 45 in.

**Queen Elizabeth.**—On June 6th the new saloon steamer *Queen Elizabeth* was launched by Messrs. Edwards & Co., at Millwall. The owner is Mr. Edgar Shand, who has been for so many years identified with the steamboat traffic of the Thames. The *Queen Elizabeth* is said to be the largest up-river boat that has ever been floated, and it is the intention to run her between London and Hampton Court daily.

**Eidsvold.**—On June 7th Messrs. Ropner & Son, of Stockton-on-Tees, launched a fine steel screw steamer, the dimensions of which are as follows, viz.:—Length, between perpendiculars, 330 ft.; breadth, extreme, 45 ft.; depth, moulded, 29 ft. 6 in. She has been built to the order of a Norwegian firm, Messrs. Ropner & Son having built several other steamers for the same owners. The vessel is built off the spar-decked rule, and has poop, bridge, and topgallant forecastle. She has a double bottom on the cellular principle for water ballast, and has been designed to carry a deadweight cargo of 5,550 tons on Lloyd's summer freeboard. The vessel will have all the most recent appliances for the expeditious and economical loading and unloading of cargoes; has direct steam windlass, steam steering gear amidships, with powerful screw gear aft, four large steam winches worked by a large multitubular donkey boiler, stockless anchors, &c. She will be fitted with a set of triple-expansion engines, by Messrs. Blair & Co., Limited. The christening ceremony was gracefully performed by Mrs. Schylder, wife of the captain, who gave the name of *Eidsvold* to the steamer.

**Spitfire.**—On June 7th the torpedo-boat destroyer *Spitfire*, built by Messrs. Armstrong, Mitchell, & Co., for the British Admiralty, was launched at Newcastle. The *Spitfire* is a sister ship to Her Majesty's ship *Swordfish*, launched by the same firm in February. The *Spitfire* is guaranteed a speed of 27 knots, and that is expected to be surpassed. Her dimensions are:—Length, 200 ft.; breadth, 19 ft.; displacement, 265 tons. The armament is one 12-pounder quick-firing gun, five 6-pounder quick-firing guns, and two torpedo tubes. The I.H.P. of the engines is about 4,000. The *Spitfire*, like the *Swordfish*, is supplied with Mr. Beauchamp-Tower's steady platform for the search light.

**Saba.**—On June 8th there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, West Docks, South Shields, a steel screw steamer built to the order of Messrs. Scrutton, Sons & Co., London. The vessel is of the spar-deck type, with poop, bridge and topgallant forecastle, and iron deck-houses with accommodation for captain and passengers. She is of the following dimensions:—Length, 306 ft.; breadth, 41 ft.; depth, moulded, 25 ft. 7 in.; and is classed 100 A1 at Lloyd's under special survey. The engines, also built by Messrs. John Readhead & Sons, are of the triple-expansion type, having cylinders 25 in., 40 in., and 65 in. by 42 in. stroke, supplied with steam from two large steel boilers working at a pressure of 160 lbs. per square inch. The vessel is intended for the West India trade, and has been built under the superintendence of Mr. H. Barringer, superintendent engineer to the owners. She was named the *Saba* by Miss Lizzie Norris, daughter of Captain Norris.

**Majestic.**—On Saturday, June 8th, Messrs. Wm. Gray & Co., Limited, launched a fine steel screw steamer, which they have built to the order of Messrs. W. H. Cookerline & Co. of Hull. The vessel will take Lloyd's highest class, and her dimensions are:—Length, over all, 324 ft.; breadth, 44 ft. and depth, 23 ft. 8 in. The deck erections consist of a half-poop bridge over machinery space, and topgallant forecastle. The saloon and cabins are aft, the engineers' rooms in bridge and the crew's accommodation forward. The hull is built on the wet

system, with cellular double bottom throughout. Large hatchways are fitted, five steam winches, steam steering gear amidships, screw gear aft, large patent donkey-boiler, patent direct steam windlass, and shifting boards throughout, stockless anchors, two masts with schooner rig, and all modern working appliances will be fitted for general trading. The Central Marine Engine Works of Messrs. Wm. Gray & Co., Limited, supply fine triple-expansion engines, having cylinders 28 in., 36 in. and 62 in. diameter, with a 39 in. piston stroke, and two large steel boilers to work at 160 lbs. pressure per square inch. The ceremony of christening the steamer *Majestic* was gracefully performed by Mrs. Cockerline, wife of the managing owner.

**Tabasco.**—On June 8th there was launched from the yard of Mr. James Laing, Deptford-on-Wear, a steamer built to the order of the Neptune Steam Navigation Co., Limited, of which Messrs. W. & T. W. Pinkney, of Sunderland and Manchester, are the managing directors. The vessel is intended for the Neptune Line, between Baltimore and Rotterdam, and is specially constructed for the Atlantic trade. Her dimensions are:—Length, 331 ft. 6 in.; breadth, 41 ft. 9 in.; depth, 26 ft. 5 in. She is fitted with all modern improvements, with additional facilities for the quick loading and discharging of cargoes, and will be engined by Messrs. George Clark, Limited, Southwick. The cylinders are 24½ in., 40 in., and 66 in., with 45 in. stroke, and it is expected that she will attain a speed of 11 knots per hour. As the vessel left the ways she was named the *Tabasco* by Mrs. W. Briggs. The vessel is a sister ship to the *Tampico*, recently built by Mr. Laing for the Neptune Co.

**Scott.**—The steel stern-wheel steamer *Scott*, built by Messrs. J. M. Arthur & Co., and engined by Messrs. Bow, M'Lachlan & Co., was successfully launched at Paisley on June 10th. The *Scott* has been built to the order of the African Lakes Trading Corporation, Limited, and has been specially designed for service in shallow rivers, her draught of water being only 8 in. For convenience in shipping, and more especially for speedy re-erection in Central Africa, the steamer has been built in five sections, all arranged so that on arrival abroad the sections will be floated and joined together, making the steamer at once complete.

**Heater.**—On June 10th there was launched from the yard of Messrs. C. Hansen & Sons, Cowes, a fast cruising composite yacht of 60-rating, built to the order of John Gretton, junr., Esq., from the design of Mr. W. Fife, junr. Her principal dimensions are:—Length, over all, 93 ft., on load-water line, 67 ft.; extreme beam, 18 ft.; draught of water, 12 ft.

**Sir Frederick Chapman.**—On June 11th the launch of the submarine mining steamer from the shipbuilding shed of Messrs. Cox & Co., Falmouth, was successful in every way, and indeed, the most brilliant affair of the kind which has yet taken place in the neighbourhood. Lady Chapman, who came to Falmouth expressly for the purpose, went on the platform erected at the bows during a flourish of bugles, and accompanied by the chaplain of H.M.S. *Ganges*, Colonel Hisslop, Major Ruck, and Mr. J. G. Cox. After the usual prayers were said, Mr. Cox presented Lady Chapman with a handsome bouquet, and precisely at 6.30 the bottle was broken, and the vessel gracefully named *Sir Frederick Chapman* whilst gliding smoothly down the ways into her native element. The christening ceremony was imposing, being carried out in the presence of a large number of spectators in the same style as is usual at Admiralty launches of men-of-war, and the presence and participation of officers and men of the different branches of the service, the music of their bands, the numbers of gaily-dressed ladies, and the decorations put up for the occasion, made the ceremony unusually attractive. After the launch the company were addressed by Major Ruck, who alluded in a most feeling manner to the reputation and services of the lamented and beloved late General Sir Frederick Chapman, mentioned that he had gained great distinction at the Crimea, at the siege of Sebastopol, and in other actions, and after retirement from the Army had occupied important positions in London. He was followed by Colonel Hisslop, who gave hearty thanks to Lady Chapman and Major Ruck, and all others through whose assistance the affair has been made such a success. The dimensions and some leading particulars of the vessel, &c., are given hereunder, the whole, including machinery, &c., have been manufactured by Cox & Co. at their works. This makes the fifth submarine mining steamer they have supplied, besides having put new boilers and done extensive repairs to a number of other similar

steamers for H.M. War Department. The leading particulars are:—Length, 86½ ft.; beam, 18 ft.; depth, 9½ ft. Framework and plating of steel planked over all with teak-cabins handsomely fitted for four officers forward, and for eight seamen aft. Teak charthouse fitted with polished mahogany, hair-stuffed cushions, and silk rep curtains, &c. The steering gear (Archer's patent) is fitted on a steel bridge raised above the deck in the usual position. She will have two masts with square sail, staysail, and trysail, and her appliances for laying and lifting mines, consist of a steel steam crane forward, all the motions of which are controlled by a two cylinder engine below deck, also derrick, box-joggle, and combined steam winch and capstan. She has large fresh water tanks for boiler and drinking purposes, and unusually large bunker capacity. Awning will be fitted over main deck, and ventilation specially provided for. The after dead wood is omitted, and a wide balance rudder supplied, so as to enable very quick turning to be accomplished. Her engines are C.S.C., two complete sets, the cylinders being 11 in. and 22 in. by 15 in. stroke, with extra large surface-condenser and independent centrifugal circulating pump with engine attached. There is also a large Duplex pump to act as supplementary circulating air-pump, and for feed bilge and fire-engine purposes. The stokehold is to be specially ventilated. The boiler has two furnaces, has a H.P. of 110 lbs. per square inch, and the I.H.P. is to be 245 at 160 revolutions.

**Steel Twin-screw Steamer.**—Messrs. Armstrong, Mitchell & Co. launched on the Tyne last month a steel twin-screw steamer, intended for the carriage of railway trucks across the River Volga. The chief dimensions of the vessel are:—Length, 252 ft.; breadth, 57 ft. 6 in.; depth, 14 ft. 6 in. She has been constructed to the highest class Bureau Veritas. In order that the vessel may pass through the Marinsky Canal system of locks on her way to the River Volga, she has been constructed on Swan's patent divisible system, so that on arrival at the canal locks she will be divided both longitudinally and transversely into four sections. Immediately after the launch the vessel was taken to the Wallsend Slipway and Engineering Co., where she will be fitted with twin-screw machinery.

**Amana.**—On June 19th there was launched from the Jarrow Yard of Messrs. Palmer's Shipbuilding and Iron Co., Limited, a finely modelled screw steamer, built to the order of Mr. James Marke Wood, of Liverpool, of the following dimensions, viz.:—Length between perpendiculars, 350 ft.; beam, moulded, 45 ft.; depth, moulded, 27 ft. 6 in. The vessel has been built under special survey to Class 100 A in Lloyd's Register, and is of the spar-deck type, having a poop, bridge, and forecastle. Two complete steel decks are laid, extending all fore and aft. The poop is fitted for cargo, the officers and engineers being berthed in the bridge, and the crew in the forecastle. Water-ballast is provided for aft in a cellular bottom and in a deep hold tank amidships. All the necessary requirements to fit the vessel for general and grain cargoes are complied with, and all the most modern improvements for the safe handling of the vessel, and rapid loading and discharging of cargo, are supplied and fitted throughout. The vessel is designed to load a deadweight of about 5,200 tons on Lloyd's summer draught.

**Scottish Hero.**—On June 20th this turret-deck steamer was launched from the yard of Messrs. William Doxford & Sons, Limited, of Sunderland, having been built to the order of Messrs. Mollwraith, McEacharn & Co., Limited, London.

**Vida.**—A new yacht, the *Vida*, which has been built at Messrs. Wylie & Lochhead's Cabinet Works, Kent Road, for Mr. William Wylie, was taken out of the shed in which it was constructed, conveyed to the Clyde, and duly launched. The *Vida* has been built from designs by Mr. G. L. Watson, and will take a place in that class of Clyde yachts limited to 720 square feet of sail area. Her length is 30 ft. over all, and 25 ft. on the water-line.

**Cavour.**—On Monday afternoon, June 24th, Messrs. Sir Raylton Dixon & Co., of Middlesbrough, launched the largest steamer that has yet been constructed on the River Tees, having a displacement of 11,000 tons, and a deadweight capacity of 7,500 tons, with a speed of 12 knots per hour. Her owners are the well-known firm of Messrs. Lamport & Holt, of Liverpool, whose large fleet of steamers trade from Liverpool to the West Coast of South America, Brazil, and River Plate, and to whom Messrs. Dixon delivered another steamer only a few

months ago. The dimensions of the present vessel are :—Length, 425 ft.; breadth, 51½ ft.; depth, 30½ ft. She is built to Lloyd's three-deck rule, and has also poop, bridge, and fore-castle. Special arrangements have been made for the rapid discharge of cargo, and she is fitted with nine steam winches, working not only from the masts, but from standard derrick posts erected on deck, with hatches at the sides of the ship as well as those in the centre. Her machinery, which is being constructed by the North-Eastern Marine Engineering Co., of Wallsend, consists of a set of triple-expansion engines, with cylinders 31 in., 49 in., and 82 in. diameter, having a stroke of 54 in., with three large double-ended boilers working at 180 lbs. pressure. The hull and machinery have been built under the supervision of Mr. Russel, naval architect to the owners, and Mr. Morrin, their superintendent engineer, respectively. On leaving the ways the vessel was gracefully christened the *Cavour* by Miss Raylton Dixon, the daughter of the builder.

**Lady Furness.**—On Tuesday, June 25th, Messrs. Furness, Withy & Co., Limited, launched from their shipbuilding yard at Hartlepool, a large steel-screw steamer, built to the order of George Syd. Coram, Esq., of London. The vessel is a substantial type of a modern cargo-boat, measuring over 330 ft. in length, and built throughout of Siemens-Martin steel. She has a large measurement and deadweight capacity, and is built to the highest class at Lloyd's. Every care has been taken in designing this vessel to make her as suitable as possible for the deadweight trade. The vessel is built on the web-frame system, with cellular double bottom all fore and aft, subdivided at intervals, the after peak being also available as a tank. The main and fore holds are divided by iron watertight bulkheads efficiently stiffened by an iron longitudinal division. The greater portion of the shell plating is in 24 ft. lengths, and is efficiently backed up by strong sectional framing to the top of the vessel all fore and aft, the topsides being extra thick to withstand the heavy Atlantic seas. The bottom plating is also thicker in way of the ballast tanks to allow of the vessel lying aground whilst loading. The whole of the weather decks, tank top, floor plates, &c., are also of extra thickness, and the hatchways are large enough to take in the bulkiest cargo. Large winches to hatches, patent steam steering gear amidships with hand gear aft, steam windlass, large donkey-boiler and patent stockless anchors are fitted. The vessel will be rigged as a pole masted schooner, and to make her available for bridge and canal work the topmasts are telescopic. The engines and boilers have been constructed by Messrs. T. Richardson & Sons, Limited, Hartlepool, and are of massive design with every provision for economical working. On leaving the ways the vessel was gracefully christened *Lady Furness* by Mrs. Coram.

**Rhino.**—Messrs. Cochran & Cooper have lately launched from their yard at Grovehill, Beverley, a new steam trawler. The vessel is of the following dimensions :—89 ft. between perpendiculars, by 20 ft. by 10 ft. 8 in. depth of hold, has been built to the order of Mr. C. F. Sleight, of Grimsby, and is to be fitted with triple-expansion engines. These are being constructed by Messrs. C. D. Holmes & Co., of Hull. The vessel will be fitted up with all the latest improvements for trawling. On leaving the ways the vessel was christened the *Rhino*, by Miss Eleanor Sleight, daughter of the owner.

#### LAUNCHES.—SCOTCH.

**June.**—On May 24th the steel screw steamer *June* was launched from the shipbuilding yard of Messrs. Gourlay Brothers & Co., Dundee. The vessel, which has been purchased by the Straits Steamship Co., Singapore, is 180 ft. in length by 27½ ft. in breadth, and 19½ ft. in depth. Her gross tonnage is 760.

**Speculant.**—On May 25th there was launched from the shipbuilding yard of Messrs. Cumming & Ellis, Inverkeithing, a steel sailing barquentine, dimensions, 145 ft. by 27 ft., by 12 ft. 2 in. This vessel is a sister ship to the *Vigilant*, recently built by the same firm, and launched on 29th April—a report of the launch and description of the vessel appearing in our June issue. As the vessel left the ways she was christened *Speculant* by Miss Eva R. Gentles.

**Beacon Rock.**—On May 25th the Ailsa Shipbuilding Co. launched a steel screw steamer, 170 ft. by 25 ft. 9 in. by 12 ft. 10 in., moulded, for Messrs. Alfred Rowland & Co., of Liverpool, for their Rock Line of Channel traders. She will be

classed 100 A1 at Lloyd's under special survey, and will be fitted with compound engines, 21 in. and 42 in. cylinders, by 30 in. stroke, by Messrs. Muir & Houston. This is the fourth vessel built by the Ailsa Shipbuilding Co. for Messrs. Alfred Rowland & Co., and is a sister ship of the *Bishop Rock*, launched on April 18th. She was named the *Beacon Rock*.

**Betty Inglis.**—On May 25th a steam ketch, of about 109 tons, named the *Betty Inglis*, built by Messrs. Hall, Russell & Co., at Aberdeen, was launched; port of registry, Aberdeen.

**Okhla.**—On May 27th Messrs. William Denny & Bros. launched from the Leven Shipyard, Dumbarton, a large steel screw steamship of the following dimensions :—410 ft. by 50½ ft. by 32 ft., and of about 5,500 tons gross register. She has been built to the order of the British India Steam Navigation Co., Limited, for their Eastern trade. On leaving the ways the vessel was named the *Okhla* by Mrs. Macmichal, Helensburgh. Among those present at the launch was Sir James MacKay, of the B.I.S.N. Co., and others. The *Okhla* will be fitted with triple-expansion inverted cylinder engines by Messrs. Denny & Co. Field-Marshal Lord Roberts, one of the directors of the B.I.S.N. Co., was also present prior to the launch, and was shown over the yard, experimental tank, &c., but had to leave before the launch to attend a meeting in Glasgow.

**H.M.S. Terrible.**—On May 27th H.M.S. *Terrible*, first-class cruiser, and the largest vessel of her kind in the British Navy, was safely launched in the presence of a vast concourse of spectators, from the yard of Messrs. J. & G. Thomson, Clydebank. She is of the protected cruiser type, which is distinguished from the armoured cruisers of the *Aurora* class in having no belt of side armour. In lieu of this, protection of the machinery, magazines, and other vital portions of the ship is afforded by a strong steel arched deck, the crown of which is 3½ ft. above the water-line at the centre of the vessel, while at the sides of the vessel the edges of the deck are 7 ft. below the water. Additional protection to the buoyancy and stability of the cruiser is obtained by means of coal bunkers extending the length of the machinery above the protective deck, and forming when filled a solid belt of coal 19 ft. thick. In all, the hull of the *Terrible* contains 236 watertight compartments, and of these 79 are included in the double-bottom space. Between perpendiculars the vessel has a length of 500 ft. and 538 ft. over all. Her breadth is 71 ft., depth, from the upper deck, 43 ft. 4 in.; and displacement, at the load draught of 27 ft., 14,250 tons. The largest vessels of this type in the Navy have hitherto been the *Blake* and *Blenheim*, and the great advance in the direction of increased dimensions will be apparent when it is recollected that these ships are only 375 ft. long between perpendiculars, 65 ft. broad, with a displacement of 9,000 tons. Necessarily a very large space is devoted to the machinery, with the view to maintaining high speed for a long voyage at sea. Exactly 252 ft. in the central portion of the ship, or about half the total length, has been set apart for this purpose. There are in all six decks, named, starting from the lowest—platform, orlop, protective, main, upper and boat decks. The platform and orlop decks are to be utilised for the stowage of ammunition and torpedoes, and also for the steering gear, capstan engine, ventilating and air-compressing engines, and for some of the dynamos. On the orlop deck at each end of the vessel is a torpedo compartment, each containing two tubes for the discharge of 18-in. Whitehead torpedoes. Being discharged below the water, the danger is averted of the torpedoes exploding before being fired by the effects of the enemy's shell. The protective deck is chiefly to be used for stowing coals, stores, provisions and water; and on the main deck (the next highest, and the one first above the water-line) are to be mounted eight 6-in. quick-firing guns, while other four of the same size and several smaller are to be mounted on the deck above. The armament will consist in all of two 9·2-in. 23-ton breechloading guns, twelve 6-in. quick-firing guns, eighteen 12-pounder quick-firing guns, and a number of smaller quick-firing and machine guns, besides four torpedo tubes. The 23-ton guns are to be placed one on the fore-castle and one on the poop, in barbettes. An important feature is the protection from the enemy's quick-firing shot and shell which is to be afforded the men working the 6-in. guns. Each of the guns is to be mounted in what is termed an armoured casement, of sufficient size to contain the gun's carriage and the men operating. The ammunition will be passed through an armoured tube from below into the casemate. The vessel will have a capacity for stowing away about 3,000 tons of coal. The engines, which are nearly completed,

are of the vertical inverted triple-expansion type, each having four cylinders. It is intended that the collective H.P. of the two engines will be 25,000, giving a speed of 22 knots on trial, while it is anticipated that the vessel will, when at sea, be able to steam continuously at a speed of 20 knots. The boilers, which will number 48, are to be of the Belleville water-tube type, such as are used in the French Navy. Including officers and men, the *Terrible* will be manned by a crew of about 900 all told. The contract price of the hull of the new cruiser is £359,600, and that of the engines, £182,737. Calculating everything, this latest addition to the protectors of Britain's shores will involve an expenditure of £703,351. The launching ceremony was performed by Lady Overtoun, of Overtoun, Dumfriesshire.

**Valda.**—On May 27th Mr. Robertson, Sandbank, launched the six-rater he built for Mr. Harvie, of Glasgow, and which has been designated the *Little Valkyrie*. The name of the yacht is *Valda*, and it is, of course, from the design of Mr. G. L. Watson.

**Valkyrie.**—On May 27th Lord Dunraven's new yacht *Valkyrie*, built by Messrs. D. & W. Henderson, Meadowside, which had been lying on the slip since Friday forenoon awaiting a favourable opportunity, was safely launched shortly after two o'clock. Everything was ready for about 48 hours previously, and, in fact, if the tide had risen high enough, the yacht would have been floated on Saturday. As it was, advantage was taken of the night tide, which generally rises from nine inches to a foot higher than the day tide. Mr. G. L. Watson, the designer, was present, and along with Mr. John Henderson superintended the launch. There were also present Lady Rachel Wyndham Quin and Lady Aileen, daughters of Lord Dunraven, and Mrs. John Henderson. Lady Rachel, assisted by Lady Aileen, christened the yacht as she began to glide down the rails on which the carriage rested. As soon as the carriage had run down to a sufficient depth (the *Valkyrie* draws 17 ft.) the yacht floated off quite smoothly, and was afterwards towed to the Queen's Dock, where she will be fitted with mast and rigging. Lying in the dock she attracted a good deal of attention throughout the day. The launching party waited to see the yacht towed away and then left the yard. The time of launching was about 45 minutes before high water. Mr. Watson calculated that the tide would have risen about 9 in. more, but as there was depth enough it was not considered necessary to wait. There was almost no wind to affect the rise of the tide in any way. The sky was clear, and everything was perfectly still. The yacht was run into the water from the patent slip used by the firm for general work, and on which vessels are drawn up for repairs and afterwards launched.

**Inverneill.**—On May 28th Messrs. Russell & Co. launched from Kingston Shipbuilding Yard, Port-Glasgow, a three-masted barque named *Inverneill*, of 1,470 tons register, to carry 2,750 tons deadweight. This vessel is built to the order of Messrs. George Milne & Co., Aberdeen, for whom Messrs. Russell & Co. have built several vessels. The dimensions are:—Length, 238 ft.; breadth, 36 ft.; depth, 21 ft. 8 in.

**Snapshot.**—On May 28th the s.s. *Snapshot*, a steel twin-screw yacht 70 ft. by 12 ft. 6 in. by 7 ft. 9 in., built to the order of John Henry, Esq., of Strathaven, was launched from the yard of Messrs. Thomas B. Seath & Co., shipbuilders, Rutherglen.

**Fastnet.**—On May 28th there was launched from the Caledon Shipyard, Dundee, a steel screw steamer of about 1,160 tons, intended as an addition to the fleet of the Clyde Shipping Co., Glasgow. This is the twelfth vessel built by W. B. Thompson & Co., Limited, for this company. The principal dimensions of the steamer are:—Length, 255 ft.; breadth, 35 ft.; depth in hold, 16 ft. 11 in. She has been built to the rules of the British Corporation, and will be placed on the company's passenger trade between London and the Clyde, and also for the passage to the west coast of Ireland as occasion may require. The engines of the vessel are of the triple-expansion type. The vessel has been fitted with the electric light from stem to stern, and the fittings have been placed in the steamer by the Faraday Electrical Engineering Co., Limited, Glasgow.

**Szechuen.**—Messrs. Scott have lately launched at Greenock a steel screw steamer built to the order of the China Steam Navigation Co., Limited. The vessel was christened *Szechuen*, and her dimensions are as follow:—Length, 260 ft.; breadth,

38 ft.; and depth, 22 ft. 6 in.; with a carrying capacity of 2,400 tons. The *Szechuen* will be supplied with triple-expansion engines of 1,500 I.H.P., and is the sixth steamer of an order of ten contracted for by the China Steam Navigation Co.

**Cadiz.**—On June 5th Messrs. Charles Connel & Co. launched from their yard at Scotstoun a steel screw steamer named the *Cadiz*, for Spanish owners. Dimensions:—Length, 390 ft.; breadth, 46 ft.; depth, 31½ ft., with a gross tonnage of 4,350 tons. The *Cadiz* is sister ship to the *Barcelona*, launched from the same yard on the 7th of last month, which also was for Spanish owners.

**Manelau.**—On June 5th Messrs. Scott & Co., Greenock, launched a steel screw steamer, named *Manelau*, for the Ocean Steamship Co., Liverpool. Dimensions:—Length, 390 ft., breadth, 47 ft.; depth, 30 ft.; of 4,500 tons gross, and with a carrying capacity of 6,500 tons. The builders will supply triple-expansion engines of 2,500 I.H.P. The *Manelau* is a sister ship to the three recently launched by Messrs. Scott & Co. for the same firm. She is a cargo-carrying steamer, and is to be fitted with all the best appliances for the working of goods.

**Nubia.**—On June 6th there was launched from the yard of Messrs. Ramage & Ferguson, Limited, Leith, a steel screw steamer for Messrs. James Currie & Co., Leith, for their Continental trade. She is designed for a speed of 11 knots at sea, loaded with 1,500 tons deadweight. This is the eleventh steamer built by Ramage & Ferguson, Limited, for the above owners, and the twelfth is in a forward state, and will be launched in about four weeks. The ceremony of naming the vessel *Nubia* was performed by Miss Jardine, Edinburgh.

**Catania.**—On June 6th Messrs. David and William Henderson & Co. launched from their yard at Partick a handsome steam yacht, which they have built for His Grace the Duke of Sutherland, to the designs of Messrs. G. L. Watson & Co. The yacht is classed in Lloyd's, and is of the following dimensions:—Length over all, 225 ft.; breadth, 26 ft. 6 in.; depth, 16 ft. 6 in. Externally the vessel has a very graceful appearance, the stem being surmounted by a full female figurehead. A novelty in the design of the vessel is a shade-deck extending nearly three-fourths the length and from side to side of the vessel, covering the deck-houses and machinery casing. This will furnish a long unbroken promenade not usually obtained in a steam yacht. It is supported at the sides by stanchions above the main rail. A teak chart-house is fitted on this deck, also the navigating bridge. The other deck-houses are two in number, and are constructed of teak. The forward one contains the galley, saloon entrance, and a large writing-room. This room is finished in polished teak, with an escritoire, reading table, &c. The galley is of large size, well lit and ventilated, with tiled walls and floors. It communicates with the pantry below by a hoist and stair. In the after deck-house is the owner's private room, fitted up in a similar style to the forward one. The remainder of this house is occupied by the after-companion and smoking-room. The yacht is lighted throughout by electricity, and heated by steam. A refrigerating engine and chamber are fitted of ample size to suit the longest voyage. An oil launch and six other boats will be carried. The auxiliary gear includes a steam windlass, steam warping capstan, steam steering gear and steam ash hoist. The machinery will be supplied by the builders' firm, and consists of a set of triple-expansion engines with four cylinders, one of 18 in., one of 38½ in., and two of 32 in., with a stroke of 27 in., and a large single-ended boiler, fitted with forced draught gear. When finished the *Catania* will form a valuable addition to the already long list of pleasure yachts built on the Clyde, everything that can add to the comfort of those living on board having been carefully studied.

**Urania.**—On June 7th the steam yacht *Urania* was launched from the yard of Messrs. James & George Thomson, Limited, at Clydebank. The *Urania* has been designed and built by Messrs. Thomson to the order of His Excellency Don Francisco Recur, of Madrid, and has been superintended during construction by Mr. Cresswell D. Haynes, M.I.N.A., of Cadiz. The *Urania* is 200 ft. long, 26 ft. 3 in. broad, and 16 ft. 6 in. deep, and has a tonnage of 550 tons, and has been built to the highest class of the British Corporation. The vessel is specially intended for long ocean cruises, and has a coal capacity of more than 200 tons, which will enable her to steam for 6,000 knots without coaling at a speed of ten knots. The vessel will have an

exceedingly handsome appearance, being rigged as a barquentine with three masts, the foremast being square rigged, and the main and mizen having fore and aft sails. The vessel has considerable sail spread, so as to economise coal on long voyages. The vessel has a graceful figurehead, a bowsprit, and a long elliptical counter, which gives her a very handsome appearance. Internally the vessel will be most luxuriously fitted up, the accommodation for the owner and friends being immediately aft the machinery, where there are six large state-rooms and a dining saloon, the whole of the fittings of these rooms being in polished mahogany. On the upper deck in a teak deckhouse is also a breakfast-room and another sleeping cabin. At the forward end of the vessel there are suitable quarters for the officers and engineers, doctor, and secretary, as well as for the crew. The yacht will be lighted throughout by electricity, and will carry a large number of storage batteries, besides a powerful dynamo. The vessel has a large electric launch, which will be capable of steaming for a distance of 100 knots, and has besides four other boats. In the construction of the vessel special attention has been given to the comfort of her passengers when cruising in tropical climates. The religious service was conducted by the Right Rev. Bishop Maguire, D.D., of Glasgow, and the vessel was named by Miss Haynes. The *Urania* will be ready to leave for Spain about the end of June.

**Plymouth Belle.**—On Saturday, June 8th, there was launched from the yard of Messrs. J. Scott & Co., Kinghorn, a steel paddle passenger steamer of the following dimensions, viz.:—220 ft. by 26 ft. by 10 ft. The vessel has been built to the requirements of the Board of Trade for a home-trade passenger certificate under the superintendence of Mr. George Walker, London, and has been specially constructed for the cross-channel service between Plymouth and the Channel Islands and the coast of France. She will be under the management of Mr. Dusting, Saltash, Plymouth, who has an extensive experience in the management of steamers of this class. The vessel was launched with her machinery on board and steam up, and immediately started for a preliminary trial. The official trial is expected to shortly take place. On leaving the ways the steamer was gracefully christened *Plymouth Belle* by Mrs. Dusting, wife of the managing owner.

**Kilkeel.**—On June 8th Messrs. John Fullerton & Co. launched at Paisley an iron screw steamer of about 275 tons, which has been built to the order of the Carlingford Lough Steamship Co., Limited, for their coast carrying trade. This is the sixth steamer built by the builders for this company, of which Mr. Joseph Fisher, Newry, is managing owner. Compound engines of 45 N.H.P. will be supplied by Messrs. Hall-Brown, Buttery & Co., Govan. As the vessel left the ways she was named the *Kilkeel* by Miss Fisher, Newry.

**Scott.**—On June 11th the steel stern-wheel steamer *Scott*, built by Messrs. J. M'Arthur & Co., and engined by Messrs. Bow, M'Eachlan & Co., was successfully launched at Paisley. The *Scott* has been built to the order of the African Lakes Trading Corporation, Limited, and has been specially designed for service in shallow rivers, her draught of water being only 8 in. For convenience in shipping, and more especially for speedy re-erection in Central Africa, the steamer has been built in five sections, all arranged in such a manner that on arrival abroad the sections will be floated and joined together, making the steamer at once complete. The *Scott* on leaving the ways was named by Mrs. F. L. Moir, wife of the managing director of the company, and their son, Master Moir, out away the dog shores.

**Renfield.**—On June 12th Messrs. Russell & Co. launched from Kingston Yard, Port-Glasgow, a four-masted barquentine of 1,010 tons net register, to carry 1,800 tons deadweight, for Mr. J. A. Russell, 12, Waterloo Street, Glasgow. The dimensions are:—Length, 210 ft.; breadth, 35 ft. 6 in.; depth, 19 ft. 6 in. This vessel is named *Renfield*, and the figurehead is the coat of arms of the county of Renfrew.

**Lady Margaret.**—On June 12th Messrs. A. M'Millan & Sons, Limited, Dumbarton, launched a saloon paddle-steamer, which has been specially constructed for the passenger service of Messrs. Edwards, Robertson & Co., Bristol, and is intended to ply between that city and other places on the Bristol Channel, her voyages in summer extending as far as Penzance. The dimensions of the vessel are:—Length, 215 ft.; breadth, 25 ft.; and depth, 16½ ft. She will be fitted by Messrs. David Rowan & Son, Glasgow, with a set of compound surface-condensing

engines supplied with steam at 125 lbs. pressure from a multi-tubular boiler. All modern improvements for the efficient working of the vessel in her special trade have been supplied, and include steam steering gear, steam windlass, steam warping capstans fore and aft, and a full installation of electric light. The construction of the steamer has been superintended by Mr. R. Morton, of Messrs. Morton & Williams, 26, Bothwell Street, Glasgow, and all the arrangements and fittings are being carried out to his designs. The ceremony of christening the steamer *Lady Margaret* was performed by Mrs. Alfred Morton, Glasgow, and immediately after the launch the vessel was towed to Glasgow to have her machinery put on board.

**Atlas.**—On June 18th Messrs. Fleming & Ferguson, engineers and shipbuilders, Paisley, launched from their yard the powerful steel screw tug *Atlas*. The vessel has been built to the order of the Admiralty, and will be fitted with compound surface condensing engines. The *Atlas* is part of an order for plant required by the Admiralty for improvements being made in the harbour accommodation at Gibraltar.

**Monkbarns.**—On June 20th there was launched from the shipbuilding yard of Archibald M'Millan & Son, Limited, Dumbarton, a handsome steel sailing vessel of about 1,950 tons register. The vessel will be ship rigged, and is fitted with open topgallant fore-castle, deck-house for the accommodation of the crew, &c., and full poop, and her outfit includes all the modern appliances for the efficient working of such a vessel. The ship is owned by Messrs. David Corsar & Sons, of Liverpool and Arbroath, and the ceremony of naming her *Monkbarns* was performed by Mrs. David Corsar, jun., of Cairnshill, Arbroath. Captain Summers is superintending the vessel on behalf of the owners.

**Veglia.**—On June 24th Messrs. D. & W. Henderson & Co. launched from their yard at Meadowside, Partick, a large steel screw steam yacht, named the *Veglia*, which they have built for Baron Nathaniel de Rothschild, of Vienna, from designs by Mr. G. L. Watson, Glasgow. The dimensions of the yacht are:—Length, over all, 275 ft.; breadth, 80 ft. 6 in.; depth, 20 ft. The vessel has been built under Lloyd's special survey, and will class 100 A1 in their yacht registry. The arrangements of the yacht are of the most complete description. There are two deck-houses, the former one being surmounted by a teak chart-room and wheel-house. This house contains the captain's room, private writing-room, and a large deck saloon, with the main stairway to the forward cabins. The engine casing is continuous with this house, and contains a drying-room, photographic-room, lamp-rooms, and galley. The after deck-house forms a smoking-room and the after companion. There are small side-houses on this deck, providing cloak and boot-rooms, lavatory and larder, &c. Below deck the crew are berthed at the fore end, and aft of their rooms are six apartments, dining-cabin, pantry, &c., for doctor, officers, and engineers. The servants' rooms are at the stern. The owner's accommodation is most handsomely finished and decorated. The state-rooms are seven in number, that of the owner extending the full width of the ship. The drawing-room, which is forward of the machinery, is of unusual dimensions, and in combination with the extreme height from deck to deck will form an apartment seldom seen on board a yacht. The dining-saloon is a little smaller. Below the cabin deck are a number of store-rooms, wine cellars, ammunition rooms, and a large lavatory for the use of the crew, fitted with baths, &c. Among other items of the vessel's outfit may be mentioned refrigerating machinery and chamber, electric light, electric bells, electric fans for ventilation, hot water heating pipes; and on deck, steam steering gear, steam windlass, and steam warping capstan. The vessel will be rigged as a two-masted schooner, with square sails on the foremast, and when completed will, with her clipper stem, overhanging stern, and the long range of deck-houses, present a very graceful appearance. The machinery has been constructed by the builders' firm, and consists of a set of triple-expansion engines and a very large boiler fitted with forced draught. The cylinders are 23 in., 38 in., and 64 in. diameter, with a stroke of 36 in., and the working pressure is 160 lbs.

**Sumatra.**—On Tuesday, June 25th, Messrs. Alex. Stephen & Sons launched from their shipbuilding and engineering works at Linthouse, the s.s. *Sumatra*, built to the order of the P. & O. Steam Navigation Co. The dimensions of the vessel are, 400 ft. by 46 ft. 6 in. by 31 ft., with long bridge,



poop and fore-castle. Gross tonnage about 4,650 tons, and a deadweight carrying capacity of about 5,900 tons. She has been built to class 100 A1 at Lloyd's three deck rule, but is in many respects strengthened in excess of their requirements, and complies with the Admiralty regulations for transport service. There are seven watertight bulkheads, all extending to upper deck and provided with watertight doors, so that a clear passage can be had fore-and-aft in upper 'tween decks. Water ballast is provided for in double-bottom throughout. The fore-and-after peaks can be used for carrying fresh water when desired. The weather decks are all sheathed with teak. The holds and bunkers are amply ventilated by a combination of Uteley's and ordinary ventilators. The most ample provision is made for working the cargo by steam winches and cranes. The boats are fitted with Angove's patent disengaging gear. There is accommodation for over 50 first-class and 25 second-class passengers. The first-class passengers are located in large and airy state-rooms under bridge deck, with dining-saloon at fore end. The music-room and smoking-room are placed on bridge deck and enter direct from that deck. The saloon, music-room, and smoking-room are beautifully decorated apartments. The structural parts of the joiner's work were executed in the workshops at Linthouse. The companion way is fitted in an entirely novel style of decoration in Persian character. The spaces between the beams of ceiling are filled in with two panels from old Venetian work of strongly Persian design in Tynecastle canvas, and these are surrounded and parted in the centre by broad bands of highly relieved work. The colouring is in soft tints and heightened with gilding. A deep frieze in panelled spaces shows a new development in interior decoration and has not before been applied to ship work, but its suitability as well as its beauty are at once apparent. The basis of the design is in the patent modelled canvas, and the vases, flowers, &c., of purely Persian character, are relieved with great effect by a ground work of beautifully varied mosaic of a delicate mixed blue. The canvas tracery which plays through the design is gilded in a soft lemon tint, and in parts the flowers, &c., are tinted with lacquers. The hardwood of the dado is in stained ash, the framework being of a bright walnut colour, and the upper panels adjoining the mosaic are in stained green ash. The covering of the seats is in velvet, of a greenish-gold colour. A pleasant feature in the structure of the companion is the introduction of three characteristically stained-glass panels in the frieze over the piano, these are constructed to open to the spacious lightwell over the saloon. The saloon is approached from the companion-way by a handsome staircase in teak, and at each side of the stairway, as it rises from the saloon, are sideboards of an L shape plan, a handsome front in each looking towards the saloon, and a return front towards the sides, adjoining the doors leading to the service-rooms and state-rooms. The sideboards rise in stages at the back, and finish on the ceiling by carved canopies. In the ceiling the fielding is covered with a delicately modelled design in canvas, of Italian character, specially prepared for the *Sumatra*. The colour is of ivory tint, and is touched with gilding. The wall spaces between the portlights are panelled with clear polished plane-tree, resembling mellow ivory, and a delicately modelled canvas arabesque in gold, with pinkish-grey ground, fills the centre space in each; similar upright panels divide the other wall portions into spaces of from 3 ft. to 4 ft., which are enriched by a chaste design of Italian gilt work in modelled canvas on a soft white ground, and playing through the gilded ornament is a soft amber geometrical device. The dado work, sideboards, and light framing of the spaces between the arabesque panels in the upper stage, is of golden-tinted satin walnut, and the panels are of selected satin-wood, mellowed by staining. The colour of the figured velvet used for the seats is of a delicate deep rose colour. The smoke-room is of the same character as the companion-way, but the woodwork is of teak framing, with richly-stained mahogany panels, surrounded by ebonized mouldings. The mosaic grounding in the patent Tynecastle mosaic frieze is of varied silvery opal colours. The second-class passengers are berthed under poop deck in large and well-ventilated state-rooms, with suitable dining accommodation. The saloon is entered by a stairway leading from a house on poop deck, which is of ample size, and is fitted up in a very comfortable manner, so as to form a sitting-room for the passengers. The whole of the state-rooms are fitted with Hoskin's patent iron folding-up beds. The captain and first and second

officers have rooms on bridge deck, and the engineers and remaining officers' rooms are under bridge deck, while the petty officers, stewards, native servants, and native crew are located under fore-castle deck. All these spaces are airy and well lighted. The 'tween decks are pierced throughout with sidelights, and the vessel is arranged so that she could be used as a transport on very short notice, the main structure requirements being already provided. The engines have cylinders 28 in., 46 in., and 77 in. diameter by 54 in. stroke. The boilers are large, fitted with Howden's forced draught, and work at 160 lbs. pressure. There is an unusually complete system of pumping and auxiliary engines, vertical compound. Electric light is carried through the entire ship. The ceremony of naming the vessel *Sumatra* was gracefully performed by Mrs. Stephen, of Kelly.

**Craigmore.**—On June 25th Messrs. Rodger & Co. launched at Port-Glasgow a steel sailing ship of 1,800 tons net register, to carry 3,800 tons deadweight, the dimensions being as follows:—Length, 266 ft.; breadth, 40 ft.; and depth, 23 ft. 6 in. She has been built for Messrs. Thomson, Dickie & Co., Glasgow, and was named *Craigmore*.

**Dania.**—On June 25th Messrs. Russell & Co. launched at Greenock a steel screw steamer of 5,450 tons carrying capacity, and of the following dimensions:—Length over all, 352 ft.; breadth, 43 ft.; and depth, 29 ft. She was christened *Dania*, and will be supplied by Messrs. Fleming & Ferguson with triple-expansion engines. The vessel has been built to the order of Messrs. Heckaher & Co., Copenhagen.

**Ortoire.**—There has lately been launched by Messrs. Simons & Co., at Renfrew, a twin-screw dredger, built to the order of the Crown agents for the Colonies. It has been constructed under the direction of Messrs. Coope, Son & Matthews, C.E., Westminster, and is intended for dredging operations to be effected at Trinidad (W.I.). It is named the *Ortoire*.

#### LAUNCH.—IRISH.

**Georgic.**—On June 22nd Messrs. Harland & Wolff launched at Belfast the twin-crew steamer *Georgic*. The new vessel, which has been built for the Oceanic Steam Navigation Co., Limited, and is intended to run their cargo and live stock service between Liverpool and New York, is said to be the largest cargo steamer afloat. Her tonnage is about 6,580 net and 10,000 gross. She will be fitted for the accommodation of about 900 head of cattle on the upper and bridge decks, and will in addition have permanent stalls for a large number of horses in the centre of the upper deck. The machinery consists of two sets of triple-expansion engines, and the vessel will be fitted throughout with the electric light.

#### TRIAL TRIPS.

**Granby.**—On May 22nd the s.s. *Granby* completed her trial run round from the Tees to Cardiff, arriving there after a very satisfactory run; her machinery giving the most satisfactory results, and having worked very smoothly and without a hitch on the voyage round. The steamer was launched by Messrs. Ropner & Son a short time ago, her dimensions being:—Length, 270 ft.; breadth, 39 ft. 6 in.; depth moulded, 17 ft. 2 in. She is of the partial awning decked type, having poop and raised quarter-deck, her deadweight carrying capacity being 2,550 tons on 16½ ft. The saloons and cabins are fitted in the poop for the accommodation of captain and officers, whilst the engineers are accommodated in iron houses built on the awning deck, in close proximity to the engine-room. She is built on the web-frame principle, the holds being entirely free for cargoes; has cellular bottom for water ballast, and also after-peak tank. The steamer has been fitted with all the most recent appliances for loading and unloading her cargoes expeditiously and with economy. She has steam steering gear amidships, and is equipped with four steam winches, worked by two large donkey boilers, the pressure of steam being the same as on the main boilers, and has patent windlass, stockless anchors, &c. The engines will work up to about 700 effective H.P., and are by Messrs. Blair & Co., on the triple-expansion principle, and having cylinders 19 in., 31½ in., and 51 in. by 36 in. stroke; there are two large steel boilers working at 160 lbs. pressure.



**Robin.**—On May 23rd the new steam trawler *Robin*, belonging to the Pioneer Steam Fishing Co., Grimsby, underwent a successful trial before being taken over from her builders, Earle's Shipbuilding Co., when the machinery worked to the satisfaction of all concerned.

**Scott Harley.**—On May 23rd the trial trip of the s.s. *Scott Harley* took place from the Passage Docks, where she had been undergoing some necessary repairs for some time past. At 11.30 the large company which had been invited for the occasion proceeded on board the *Scott Harley*, which immediately started on her trial trip around the harbour. The day was delightfully fine, and the large company present had a most cheerful and enjoyable time. The *Scott Harley* is owned by Messrs. Scott, Harley & Co., of Cork. It will be remembered that the vessel stranded in Tramore Bay in November last, when she sustained very considerable damages. She was subsequently floated by the London Salvage Association and towed into the Passage Docks, where, after the completion of some lengthy negotiations with the underwriters, Messrs. Scott, Harley & Co. decided to have her repaired. The work has been turned out most creditably, and the owners of the steamship are highly pleased with the thorough finish which has been imparted to her. The contract was entered into in March last, and the work has been completed within the contracted time—viz., ten weeks: and when we consider the extent of the repairs which were necessary, this is very creditable to the management and workmen of the Passage Docks. The firm is at present busily engaged in fulfilling some large contracts. The Cork Steam Packet Co.'s steamer *Upupa*, and the s.s. *Hispania* are now undergoing repairs in the Docks, while they have also secured an order from the Grand Canal Co. of Dublin, to build five iron barges, which will be commenced very shortly. It is to be hoped that local steamship owners will follow the praiseworthy example of Sir John Scott, and by this means give an impetus to local enterprise.

**Cambria.**—On May 24th the new paddle steamer *Cambria*, built by Messrs. H. McIntyre & Co., Alloa, and contracted for and engined by Messrs. Hutson & Sons, Kelvinhaugh Engine Works, Glasgow, for Messrs. P. & A. Campbell's, Limited, Bristol Channel fleet of passenger steamers, went down the Firth of Clyde on a pleasure cruise after performing her speed trials at an earlier hour. The mean speed attained on the measured mile was 18.5, the behaviour of the vessel giving entire satisfaction. The dimensions of the *Cambria* are:—Length, 225 ft. between perpendiculars; 26 ft. beam, and 9 ft. 6 in. depth. She is fitted with a pair of compound diagonal engines, having 37 in. and 67 in. cylinders, and 66 in. stroke. Steam is supplied by a haystack boiler 16 ft. 6 in. in diameter by 15 ft. high, working a pressure of 100 lbs. The *Cambria* has been built of very heavy scantlings, and has a home trade certificate. She is substantially built for the requirements of all kinds of weather. Her internal arrangements are in every way complete, the upholstery being of a first-class nature. The *Cambria* will run from Bristol, Sharpness, and Cardiff to Ilfracombe, Tenby, and Clovelly, making occasional trips to south of England and French ports. She is the fifth steamer contracted for and engined by Messrs. Hutson & Sons for the same company, each and all of which have given the greatest satisfaction, and proved of great speed and power. She has been fitted out with electric light and patent water-motor ventilators. A patent compass supplied by Messrs. White, Thomson & Co. is fitted on the bridge. Amongst those on board were—representing the owners, Capt. Peter and Alex. Campbell; the builder, Mr. H. McIntyre; and the engineers, Messrs. Guy Hutson & Guy Hutson, jun. The others, inclusive of many ladies, were—Baillie Shearer, Glasgow; Captain Taylor, Glasgow; Captain Thomlinson, Bristol; Dr. Geo. Marshall, Mr. J. J. Ferris, Mr. Ivie Dunlop, Messrs. Hugh, David, and Robert Highgate, and Mr. Duncan Campbell (Messrs. Kesson & Campbell, Parkhead).

**Wild Rose.**—On Friday, May 24th, the steam yacht *Wild Rose*, belonging to Mr. G. Troyte, Chafyn Grove, which yacht has just been fitted with new machinery by Messrs. Day, Summers & Co., of the Northam Iron Works, Southampton, went out for trial trip, and the results obtained were very satisfactory. The yacht was originally fitted with a tandem compound engine, having cylinders 9 in. and 21 in. diameter, and 18 in. stroke with one crank, and on trial in Stokes Bay in August last with this machinery the mean speed obtained was only 7.128 knots. The new engines fitted by Messrs. Day,

Summers & Co. are of the compound inverted double cylinder type, the cylinders being 12 in. and 24 in. diameter by 18 in. stroke, and the boiler, is 8 ft. 9 in. diameter by 8 ft. 6 in. long, the heating surface being 700 square feet, and the working pressure 110 lbs. This machinery occupies no more space than was taken up by the old engines and boiler. On the trial trip at the measured mile in Stokes Bay the mean speed obtained on four runs was 10.449 knots, with an I.H.P. of 176, with which result the owner was very much pleased, the contractors having guaranteed a speed of 10 knots only.

**Elfie.**—The s.s. *Elfie*, built by Messrs. William Gray & Co., Limited, for Messrs. C. Nielsen & Son, West Hartlepool, had her trial trip on May 24th. The vessel has been built to Lloyd's highest class, and is of the following dimensions, viz.:—Length over all, 280 ft.; breadth, 37 ft.; depth, 19 ft. 6 in. The deck erections consist of poop, raised quarter-deck, long bridge and top-gallant fore-castle. A tasteful saloon, state-room and accommodation for captain and officers have been fitted up in the poop, and comfortable quarters for the engineers at the after end of the bridge, and for the crew in the fore-castle. The vessel is built on the web-frame system, with cellular double-bottom for water ballast, and there is also a large ballast tank in the after peak. Four steam winches, donkey boiler, steam steering gear amidships, screw gear aft, patent windlass, schooner rig, boats on beams overhead, and all modern appliances have been fitted. The engines are of the triple-expansion type, supplied by the Central Marine Engine Works of William Gray & Co., Limited. The cylinders are 19 in., 30½ in., and 51 in. diameter, and the piston stroke 36 in. The boilers, built of steel, are of large size, and give an ample supply of steam at a working pressure of 160 lbs. per square inch. The vessel went to sea about one o'clock in the afternoon, and, after a most satisfactory run in the bay, during which her engines and machinery behaved admirably, she proceeded to the Tyne to load for Spezzia. A speed of about 11 knots was made on the run round. A large company of ladies and gentlemen were present, including Sir William Gray, Mr. C. Nielsen, the Misses Nielsen, Mr. H. C. Nielsen, Mr. Mudd, Captain Murrell, Mr. Olsen, Mr. Staveley, Mr. Hansen, Mr. Bennett, Mrs. Charles Nielsen, Mrs. Hans Nielsen, and many others.

**Hero.**—Earle's Shipbuilding and Engineering Co., Limited, Hull, have just completed another steamer for the fleet of Messrs. Thomas Wilson, Sons & Co., Limited, of the same town. The new vessel, named the *Hero*, is 217 ft. long; 30 ft. beam, and 13 ft. 8 in. depth of hold, her engines being triple-compounds, 18 in., 31 in., and 53 in. diameter, by 33 in. stroke, and her two boilers of the water-tube type, on Babcock & Wilcox's patent, made for a working pressure of 200 lbs. on the square inch. On June 7th a very exhaustive trial was made outside the Humber for the purpose of testing the capabilities of the ship and her machinery, and all results were of a most gratifying nature, the vessel proving very steady and attaining an average speed of 13½ knots on the measured mile, the engines working very smoothly and efficiently, and the boilers giving an abundance of steam. All being satisfactory, the *Hero* has now commenced running in the Jersey trade.

**Vega.**—On May 28th the new yachting steamer *Vega*, which has been built by Messrs. Thompson, of Sunderland, was taken for her trial trip off the Northumberland Coast. She left the Wear in the morning, and was subjected to a prolonged trial, during which her machinery worked without a hitch of any kind, an average speed of over 14 knots per hour being attained over the measured mile. This vessel has been built to the order of the Bergenske Steamship Co., Bergen (of which P. H. Mathiessen & Co., Newcastle, are the agents), and is intended for their Newcastle and Bergen route and for yachting cruises to the Norwegian fjords during the summer season in conjunction with the well-known *Ragnvald Jarl*, of the Nordenfjeldske Co. The principal dimensions of the *Vega* are 235 ft. by 32 ft. by 22 ft. 4 in. moulded depth, and her register tonnage 1,200. The engines and boilers have been built by Mr. John Dickinson, of Sunderland. After the trial trip the *Vega* proceeded direct to Bergen.

**Trevarrack.**—On May 28th the new screw steamer *Trevarrack*, built to the order of Messrs. Edward Hain & Son, St. Ives, by Messrs. John Readhead & Sons, South Shields, was taken on her trial trip off the Tyne. The vessel is of the following dimensions:—Length, 284 ft.; breadth, 39 ft.; depth, moulded,

19 ft.  $\frac{3}{4}$  in. The engines, also built by Messrs. John Readhead & Sons, are of the triple-expansion type, having cylinders of 20 $\frac{1}{2}$  in., 33 $\frac{1}{2}$  in., and 55 in. diameter, and 36 in. stroke, steam being supplied from two large steam boilers, working at a pressure of 160 lbs. per square inch. After the compasses had been adjusted, the vessel steamed north and south, her speed, &c., being thoroughly tested over the measured mile, 11 $\frac{1}{2}$  knots being attained. The engines worked smoothly, the trial being highly successful and satisfactory to all concerned, and quite up to the anticipations of both owners and builders. After the trial the vessel proceeded to load a cargo of coals for Constantinople.

**Saratovskii Ledokol.**—The twin-screw ice-breaking steamer *Saratovskii Ledokol*, built at the Walker Shipyard on the Tyne, for services on the river Volga, was taken lately to sea for her trial trip. The vessel is 160 ft. long, by 36 ft. beam, and as she must pass through the Marinsky system of canal docks, which are only 28 ft. wide, whereas the beam of the vessel is 36 ft., she has been constructed on Swan's patent "divisible" system, whereby the vessel can be readily divided in two parts longitudinally and subsequently rejoined afloat. The steamer will be employed in keeping an open passage on the Volga, so that the traffic of the railway ferry steamer may be carried on uninterruptedly. The vessel is fitted with twin screw machinery, manufactured by the Wallsend Slipway and Engineering Co., which gave every satisfaction, a mean speed of over 14 miles per hour being attained. A special feature of the vessel is that her boilers are fitted for oil burning, and the trial was conducted entirely with this kind of fuel.

**Joseph Sciclune.**—The official trial trip lately took place down the Firth of Forth of the s.s. *Joseph Sciclune*, built by the Grangemouth Dockyard Co. for Messrs. Joseph Sciclune & Sons. Her moulded dimensions are 354 ft. by 57 ft. by 19 ft. 3 in. She is of the builders' improved well-decked type, carries a deadweight of 2,550 tons upon Lloyd's summer freeboard, and is fitted with double bottom throughout. Her engines, which were supplied by Messrs. Hutson & Son, Kelvinhaugh engine works, Glasgow, are of the triple-expansion type, having cylinders 22 in. 36 in., and 58 in., by 39 in. stroke, with two very large boilers. The vessel has steam steering gear by Alley & M'Lellan, and Emerson & Walker's direct steam windlass, and is fitted with all the latest appliances for loading and discharging cargo. The owners were represented by Captain de Maria (who is going to take charge of the vessel) and Mr. Simpson, of Glasgow, who expressed themselves highly satisfied with the speed, which was nearly half a knot in excess of the guarantee, the engines working smoothly throughout without a hitch. After the runs on the measured mile the ship proceeded outside, where her behaviour was considered to be eminently satisfactory.

**General Alava.**—On May 28th the transport steamer *General Alava*, just completed by Messrs. Archibald M'Millan & Son, Limited, for the Spanish Royal Government, went down the Firth on her trial trip. The vessel, the dimensions of which are 212 ft. by 30 ft. by 18 ft. 9 in., has been specially constructed for the transporting of troops amongst the Philippine Islands, and all her arrangements and outfit are designed to make her suitable for this purpose. She is fitted with a set of triple-expansion engines, 17 in., 27 in., and 45 in. by 30 in. stroke, constructed by Messrs. David Rowan & Son, Glasgow, and after exhaustive trials, during which everything worked satisfactorily, it was found that the speed attained was considerably in excess of that guaranteed by the builders. The company present included His Excellency General Cervera, Chief of the Spanish Royal Naval Commission, London; Senor Prieto, and other officials of the Commission; Captain Talero, Naval Superintendent, under whose inspection the vessel has been constructed; Lieut. Cervera, of the Royal Spanish Navy; Captain de Avila, commander; Captain Vazquez, second commander; Lieut. Oal, and other officers of the ship; Senor Ventura de Callejon, Spanish Consul in Glasgow; Senor Eduardo Alvarez, Vice-Consul; Captain J. F. Caminos, of the Argentine Navy; Mr. Haynes, of Cadiz, and a number of other gentlemen. The steamer returned to the Tail of the Bank, and will leave shortly for her station in the East.

**Cairnloch.**—On May 30th the steamer *Cairnloch*, recently launched by Messrs. Short, at Sunderland, and built to the order of the owners of the Cairn Line of steamers, Newcastle-on-Tyne, of which Messrs. Cairns, Young & Noble are the managers, was taken on her trial trip with satisfactory results. The vessel, after a series of runs over the measured mile at

Whitley, attained a mean speed of 11 knots, the engines working very smoothly. The dimensions and particulars of the vessel and engines are as follow:—Length, 255 ft.; breadth, 36 ft. 8 in.; and depth, moulded, 20 ft. 4 ins.; with a deadweight carrying capacity of 2,550 tons. The engines are by Black, Hawthorne & Co., Limited, of Gateshead, having cylinders 19 in., 31 in., and 51 in. diameter, with a stroke of 36 in., with steel boiler, having a working pressure of 160 lbs.

**Rebecca.**—On June 4th the s.s. *Rebecca*, recently launched by Messrs. John Fullerton & Co., of Paisley, and built to the order of the Carnarvonshire and Merionethshire Steamship Co., Limited, of Portmadoc, went on her trial trip. Her principal moulded dimensions are 140 ft. by 23 ft. by 10 ft. 6 in. She is intended for the company's coasting trade, and has also accommodation in deck-house for a number of passengers. The machinery was supplied by Messrs. Ross & Duncan, Whitefield Works, Govan, the engines being of the compound surface-condensing type, with cylinders 18 in. and 36 in. in diameter, by 26 in. stroke, and the boiler, of large size, working at 120 lbs. pressure.

**Grenadier.**—On June 7th the *Grenadier*, the latest addition to the fleet of steamers of the Tyne Steam Shipping Co., which has been built by Messrs. Wigham Richardson & Co., Low Walker, went for a trial trip off the Tyne, which proved eminently satisfactory. The steamer is 240 ft. in length by 30 ft. beam by 17 ft. deep, and is rigged as a three-masted fore-and-aft schooner. She has very comfortable accommodation for 56 first-class passengers, and 26 second-class passengers. The vessel replaces the old *Grenadier*, which was lost last year, and is intended for the trade between the Tyne and Rotterdam, which since it was commenced by the company 30 years ago has largely developed.

**Dandie Dinmont.**—On June 8th the new steamer *Dandie Dinmont*, built for the North British Steam Packet Co. by Messrs. A. & J. Inglis, Pointhouse, was officially tried under the supervision of Mr. Robert Darling, manager to the company. The keel of the *Dandie Dinmont* was laid less than four months ago, her construction being much impeded by the severe weather of last spring. The steamer proceeded to Skelmorlie, and a series of runs were made at the measured mile, when a speed of 17.808 knots were attained, or within a small fraction of 20 miles per hour.

**Charterhouse.**—On June 8th the *Charterhouse*, a large steamer of about 5,000 tons carrying capacity, lately built by Messrs. John Priestman & Co., Southwick, was taken for her trial trip. The vessel is for the firm of Messrs. Galbraith, Pembroke & Co., London, and she is of quite a new type, having only one deck laid, thereby leaving very large and convenient holds for the quick working of cargoes. The satisfactory speed of 11 $\frac{1}{2}$  knots (average) was attained with about 1,200 tons deadweight on board. The dimensions of the *Charterhouse* are as follows:—Length, 336 ft.; 45.6 ft. broad, and 26.1 ft. moulded depth. The engines, which have been built by Messrs. William Allan & Co., Sunderland, are of the triple-expansion type, having cylinders 24 in., 38 in., and 64 in., with a 42-in. stroke.

**Turret Cape.**—On June 8th the latest addition to the fleet of turret steamers owned by Messrs. Petersen, Tate & Co., of Newcastle-on-Tyne, took her trial trip. The *Turret Cape* has been built by Messrs. W. Doxford & Sons, of Sunderland, and she is a sister ship to the *Turret Crown*, recently turned out for the same firm, and intended for the St. Lawrence trade. She carries 3,150 tons on a draught of 18 ft., and measures:—Length, b.p., 253 ft.; breadth, moulded, 44 ft.; depth, moulded, 21 ft. 9 in.; and the gross regular tonnage is 1,990 tons, and the nett register 1,132 tons. The engines, which are placed aft, are of the triple-expansion type, the cylinders being respectively 21 $\frac{1}{2}$  in., 36 in., and 59 in. diameter; length of stroke, 39 in. A novelty in both the hull and boilers is that they have been constructed on the Bell-Rockcliffe system of joggled plating, which has recently been introduced by Messrs. Doxford & Sons. The vessel was tried several times over the measured mile, and averaged a speed of 11 $\frac{1}{2}$  knots, which was considered satisfactory. The *Turret Cape* after her trial proceeded straight to Sydney (C.B.), in ballast, and on her arrival there will be engaged in the St. Lawrence coal trade, in which several turret steamers now find regular employment.

**Mathilda.**—On Saturday, June 8th, the s.s. *Mathilda*, a large steel screw steamer, built by Messrs. Wm. Gray & Co.,

Limited, to the order of Messrs. J. Christensen & Co., of Bergen, had her trial trip. She is a very fine vessel of the cargo-carrying type, and is the fourth boat built and engined by Wm. Gray & Co. for the same owners. She takes Lloyd's highest class, and also that of the Norske Veritas Registries, and is of the following dimensions:—Length over all, 336 ft.; breadth, 47 ft.; depth, 27 ft. 4 in.; with long bridge and top-gallant fore-castle. A handsome saloon, state-room, captain's room, &c., have been fitted up in the large deck-house amidships. The officers' and engineers' accommodation are also on the bridge deck, and the crew's berths in the fore-castle. The hull is built with web-frames, large hatchways are fitted, steam winches, steam steering gear amidships, and screw gear aft, patent direct steam windlass, two donkey boilers, cellular double bottom for water ballast, shifting boards throughout, stockless anchors, telescopic masts with fore and aft rig, boats on beams overhead, and a complete outfit for a first-class cargo boat have been provided. First-class triple-expansion engines have been supplied by the Central Marine Engine Works of Wm. Gray & Co., having cylinders 24 in., 38 in., and 64 in. diameter, with a piston stroke of 42 in., and two fine large steel boilers, working at a pressure of 160 lbs. per square inch. The vessel went out early in the morning, a very exhaustive trial being made to test the capabilities of the ship and her machinery. At 11 o'clock a tug took on board a large party of visitors. The engines were then started full speed ahead, the log thrown overboard, and a run of a couple of hours made, when it was found that the vessel had made a speed of 11 knots per hour. The engines ran with remarkable smoothness, the bearings keeping quite cool without the application of water, the boilers, as usual, were absolutely tight, and provided an ample supply of steam. Those interested on board the ship expressed great satisfaction at her performance, with the good running of the engines, and with the completeness of the facilities for manœuvring the ship and machinery, the vessel being replete with all the latest improvements embodied in the construction and outfit of a modern cargo steamer. An excellent luncheon was provided from the establishment of Mr. Ducksbury. Mr. Hans B. Olsen, one of the owners, occupied the chair, and proposed the healths of "The Queen" and "King Oscar II.," which were duly honoured. Capt. Murrell, who represented the builders, made an interesting speech in proposing "Success to the *Mathilda* and her owners," to which Mr. Olsen responded, and proposed "Success to the builders," paying a high compliment to Messrs. Gray & Co. for the efficiency, economy, and general excellency of their workmanship. The toast of "The Visitors" was then duly honoured. Amongst those present besides Mr. Olsen being Mr. J. Black (who has superintended the construction of the vessel and her machinery), Mr. Hans Nielsen, Councillors John Hunter, W. B. Foxton and Lohden, Mr. W. R. Staveley, Mr. A. Farmer, Mr. C. D. Thompson, Mr. L. K. Fawcett, Mr. Bennett, Mr. R. Elliott, Mr. Garbutt, Mr. A. Geipel, Mr. Lohden, Mr. Sinclair, Mr. Hudson, Mr. F. Rahtkens (Middlesbrough), Capt. W. Watson, Mr. H. Baumann, Mr. Jas. Airey, &c. After the trial the vessel at once proceeded to Odessa to load for Vladivostok.

**Afridi.**—On Saturday, June 8th, the new steel screw steamer, *Afridi*, built by Sir Raylton Dixon & Co., Cleveland Dockyard, Middlesbrough, for the China and Japan trades, to the order of the Mogul Steamship Co., of which Messrs. Gellatly, Hankey, Sewell & Co., of London, are managers, was taken to sea on her official trial trip, under the command of Captain Gidding. Her dimensions are:—Length, 372 ft.; breadth, 45 ft. 6 in.; depth, 28 ft. 4 in. The vessel, which is a beautiful model, has a carrying capacity of 5,600 tons deadweight. Her decks are all of East India teak, and she is fitted in every way in a first-class manner for the Eastern trade. Triple-expansion engines have been fitted by Messrs. The Wallsend Slipway and Engineering Co., Limited, of Newcastle-on-Tyne, with cylinders 27 in., 44 in., and 72 in. by 48 in. stroke, and working at a pressure of 170 lbs., steam being supplied from two single-ended boilers, fitted with Howden's system of forced draught. A large party was present, consisting of the builders, owners, and friends, numbering about 30, and luncheon was presided over by Sir Raylton Dixon. The trial was highly successful and satisfactory to all concerned. The vessel has been constructed under the supervision of Mr. F. Edwards, 62, Bishopsgate Street Within, London, consulting engineer to the owners, and Captain Johnson, the owners' marine superintendent. This is

the second vessel Sir Raylton Dixon & Co. have completed for the Mogul Steamship Co. this year.

**Lady Windsor.**—On June 8th the screw tug *Lady Windsor*, built by Messrs. Croom & Arthur, Leith, for Messrs. W. H. Tucker & Co., Cardiff, had a very successful trial trip on the Firth of Forth. The mean speed obtained after several runs on the measured mile was 11½ knots, which is considered highly satisfactory. Her dimensions are:—95 b.p. by 18 ft. 6 in. by 10 ft. 6 in. moulded, with engines 19 in. and 36 in. by 24 in. stroke. She is fitted up with accommodation for passengers and with all the latest improvements. She has been built under the inspection of Mr. T. W. Dillon, superintendent for Messrs. W. H. Tucker & Co.

**Harcoal.**—On June 10th the new steel screw steamer *Harcoal* proceeded to sea from the Wear for her official trial. The *Harcoal* has been built by Messrs. Wm. Pickersgill & Sons, Southwick, to the order of London owners for their general cargo trade. Her dimensions are:—Length, 295 ft.; breadth, 42 ft. 3 in.; depth, 17 ft. 2 in.; and she has been built under special survey to class 100 A1 at Lloyd's. She is designed to carry a large deadweight cargo on very light draught, having a large water ballast capacity for trimming the vessel when light. Her engines are of the triple-expansion type, having cylinders 22 in., 36 in., and 59 in., with 39-in. stroke. During the trial trip the average speed attained in the measured mile was over 11 knots, and the trial in every way proved satisfactory. After the trial the vessel proceeded to Newport to load for Rio Janeiro.

**Prosper.**—On June 10th the s.s. *Prosper*, which has been built by the Campbelltown Shipbuilding Co., and engined by Messrs. Kincaid & Co. for the China coasting trade of Messrs. Kiar & Larssen, of Dram, Norway, went on her official trial trip, and attained on the measured mile at Skelmorlie a mean speed of 11½ knots. Amongst those present on the occasion were Dr. Kiar, of Dram, representing the owners; Messrs. Rood & M'Nair, agents for the firm of Kiar & Larssen; Mr. L. Bodin, chief surveyor of the Norwegian Veritas, the vessel and her machinery being constructed to their requirements, as well as to the highest class in British Lloyd's, which registry was also represented by Mr. A. O. Heron, also Captain Gogsteid, who is to command the vessel, and several others.

**Flaminian.**—On June 18th the *Flaminian*, one of the Leyland Line of steamers, had a successful trial, after being fitted with new high pressure boilers and new cylinders. The old boilers were double-ended, and a considerable space has been saved and utilised for cargo purposes in substituting new high-pressure single-ended boilers 14 ft. 2 in. diameter and 9 ft. 9 in. long. The engines, before being altered, had four cylinders, two cylinders being placed tandem over each crank; and these have been replaced by two new cylinders 28 in. and 60 in. diameter, and 4 ft. stroke. The working pressure is 160 lbs. per square inch, and a considerable economy in the consumption of coal is effected, the results being almost equal to those obtained with triple-expansion engines. The engines worked well during the whole of the trial, and developed 1,100 I.H.P. A speed of nearly 11 knots was easily maintained in the run to Point Lynas and back, which was considered highly satisfactory. The new boilers and alterations to the machinery were the work of Messrs. Fawcett, Preston & Co., Limited.

**Greyhound.**—The *Greyhound* has been built by Messrs. J. & G. Thomson, Limited, for the Isle of Man service of the North Pier Steamship Co., of Blackpool. The *Greyhound* is a fine steamer, 230 ft. long, of the promenade deck type, somewhat similar in general appearance to the well-known *Glen Sannox*, but of smaller size, and having one funnel instead of two as in the Clyde steamer. The trip, which took place on June 11th, was the reverse of favourable, being wet and squally; but in spite of adverse conditions the contract speed was considerably exceeded, and the representatives of the owners expressed themselves more than satisfied with the performance of the vessel. The mean speed of two runs on the Skelmorlie measured mile was 18½ knots, and the vessel was afterwards steamed continuously for more than four hours, when the speed was well maintained.

**Turret Hill.**—On June 12th the steamer *Turret Hill*, which has been built by Messrs. Doxford, of Sunderland, to the order of the Broomhill Coal Co., Newcastle, was taken to sea on her trial trip. Her dimensions are:—Length, 195 ft.; breadth, 31 ft.; and 15 ft. in depth, moulded. She will carry

1,070 tons, while her engines are capable of developing 500 H.P. She is the first vessel of the turret type that has so far been built for the coal coasting trade, and, should the venture be a success, its promoters intend to adopt that class of vessel in their transport of coal from Amble to the southern ports. The vessel, under the command of Captain Stratford, averaged a speed of 9½ knots an hour. Afterwards she proceeded to Amble, where she was at once put under the drops and commenced to take in a cargo.

**Tair-el-Mina.**—On June 14th the twin-screw tug *Tair-el-Mina*, lately built by Messrs. Fleming & Ferguson, Paisley, went down the river for speed and power trials, and on the measured mile the power developed was about 20 per cent. in excess of that required by the contract, the speed being fully 11 knots.

**Barcelona.**—On June 14th the s.s. *Barcelona*, the first of a Spanish line of steamers to be run by Messrs. Pinillos, Izquierdo & Co., Cadiz, giving a monthly service between Glasgow and Liverpool and Singapore and Philippine Islands, went her trial trip. She has been built by Messrs. Charles Connell & Co., Whiteinch, Glasgow, to Lloyd's highest class, and is of the following dimensions:—Length, 390 ft.; breadth, 46 ft.; depth, 31½ ft.; load displacement, 8,700 tons. Her machinery, consisting of a set of triple-expansion engines, having cylinders 80 in., 48 in., 78 in.; stroke, 64 in.; two double-ended boilers and one large single-ended boiler, with large donkey boiler, eight steam winches, Weir's feed pumps, heater and evaporator, and all the latest improvements, have been constructed by Messrs. Dunsmuir & Jackson, Govan, Glasgow. The vessel throughout is fitted up in first-class style, with electric light, and all the best appliances for the efficient handling of cargo. The trial was most satisfactory in every respect, the speed attained with partly loaded vessel being about 14½ knots, and the I.H.P. 8,500. The hull and machinery have been constructed under the superintendence of Captain Abriquet and Mr. Arriaga. Messrs. J. B. Park & Co. are the Glasgow agents for the new line. The *Barcelona* loaded a considerable cargo before proceeding on her trial trip, and will be followed by the new steamer *Cadiz*.

**Lady Sophia.**—On June 14th the steam yacht *Lady Sophia*, 270 tons, recently launched by Ramage & Ferguson, Limited, Leith, had her speed trials on the measured mile at Gullane Bay, when a mean speed of 12.9 knots was attained with all her weights on board. This yacht has been built from designs by Mr. St. Clare Byrne, Liverpool, who was present at the trial and expressed himself pleased with the yacht's performance. The *Lady Sophia* is the property of Mr. H. Robertson, Washington Hall, Peterborough, and leaves Leith next week under the command of Captain Phillips, late of the steam yacht *Zoraida*.

**Nicolai II.**—On Saturday, June 15th, the steamer *Nicolai II.*, built by Lobnitz & Co., Renfrew, to the order of the United Steamship Co., Copenhagen, ran her official trials on the Clyde, and sailed the same evening for Copenhagen. The results gave great satisfaction to all concerned, fully a knot more than the contract speed being obtained. Mr. L. C. Caspersen, the superintending engineer of the United Steamship Co., was present on their behalf. The vessel has been built under special survey of Bureau Veritas to the highest class. Messrs. Robertson & Lucas, of Bureau Veritas, Glasgow, were present, also Captain L. B. Caspersen, Dr. Currie, Mr. Hutten and other guests. The builders have two other similar vessels on order for the same owners.

**Caledonia.**—On June 15th the twin-screw steamer *Caledonia*, which was built by Messrs. Bow, M'Lachlan & Co., Thistle Works, Paisley, to the order of Mr. Thomas Cameron, Port Sonachan, for service on Loch Awe, went on her trial trip. The vessel is to be used for passenger service on the loch, conveying passengers to and from Loch Awe Station, Port Sonachan, and other places, and for pleasure excursions. Her principal dimensions are:—80 ft. long by 14 ft. 6 in. beam by 8 ft. deep, moulded. She has a fine roomy deck, extending nearly the whole length of vessel, fitted with deck seats, and forming a splendid promenade. The saloons, which are fitted fore and aft of the engines, for the accommodation of passengers, are upholstered in a tasteful and luxurious manner, and have all the most modern conveniences. The machinery consists of two pairs of compound, surface-condensing screw

engines, steam being supplied by a horizontal marine return tube boiler. The vessel was first erected in the builders' yard, then taken to pieces, conveyed by rail, and re-erected on the shore at Loch Awe. After taking a numerous company on board the *Caledonia* went for a few hours run on the loch, when everything worked with the greatest smoothness, and to the entire satisfaction of all concerned, a speed in excess of the contract being obtained.

**Beacon Rock.**—On June 15th the new s.s. *Beacon Rock*, recently launched by the Ailsa Shipbuilding Co. for Messrs. Alfred Rowland & Co., of Liverpool, went her official trials, and attained, fully loaded, a speed of 10½ knots per hour on the mile at Skelmorlie. The engines, which are fitted by Messrs. Muir & Houston, worked satisfactorily throughout, and Mr. Rowland, who was on board, expressed himself highly satisfied.

**Rotterdam.**—On June 18th this vessel was taken on her trial trip off the Tyne. The *Rotterdam* is a vessel of the following dimensions:—360 ft. long by 46 ft. 6 in. beam, and 29 ft. 4 in. moulded depth, built under the three deck rule on fine lines by Palmer's Shipbuilding and Engineering Co. Limited, Jarrow, for the American Petroleum Co., of Rotterdam and Antwerp, and constructed to the highest class at Lloyd's and Bureau Veritas, and intended for the oil bulk carrying trade. The engines have cylinders 28½ in., 46 in., and 75 in. diameter, with a stroke of 48 in., supplied by steam from four single-ended boilers of large power. The vessel is schooner rigged, with three masts and a long poop connected with bridge, and being fitted with two funnels has a very handsome appearance. Besides the main engines the vessel has very powerful pumps and pumping system, capable of discharging 5,000 tons of oil in ten hours, besides the usual steam windlass, winches and steam capstan aft. The vessel has been designed by and supervised during building by Messrs. Fleming, Baggallay & Johnson, of London and Liverpool. The vessel was loaded to her contract draught, and on the trial maintained an average speed of 12 knots, the boilers proving of ample capacity to drive the engines easily at full speed. At the conclusion of the full speed trial progressive trials and circular trials of an interesting character were made. The full speed revolutions were 68 per minute, and the speed was tested at 60, 50 and 36 revolutions respectively, the data obtained being extremely valuable on a scientific basis as showing the comparative powers to drive a vessel of this form at varying speeds.

**Ockenfels.**—On Thursday, June 20th, the trial trip of the fine steel screw steamer *Ockenfels* took place in Tees Bay. This vessel has been constructed by Sir Raylton Dixon & Co., Cleveland Dockyard, Middlesbrough, for the Hansa Steamship Co., of Bremen, and will be commanded by Captain Hansen, and is a duplicate of the s.s. *Steinberger*, lately built for the same company. Her principal dimensions are:—Length, 352 ft.; breadth, 44 ft.; depth, moulded, 29 ft. 7 ins.; and she has a deadweight carrying capacity of 5,500 tons. The upper decks are of teak, and the holds are divided by six watertight bulkheads. Accommodation for the captain, officers and engineers, is placed amidships, the fittings being of the very best description. The vessel is supplied with all the latest appliances for rapid loading and discharging of cargo. Triple-expansion engines of the latest design have been fitted by Messrs. T. Richardson & Sons, Limited, Hartlepool, with cylinders 25 in., 39 in., 67 in. by 45 in. stroke. A full speed run of some hours duration was made, during which time the engines worked to the entire satisfaction of all on board. The boilers steamed easily at 180 lbs. pressure. The hull and machinery have been constructed under the personal supervision of Mr. D. Wulff, superintendent engineer to the Hansa Co. This is the fifth steamer Sir Raylton Dixon & Co. have completed for the Hansa Steamship Co.

**Countess of Morley**, No. 156, was put upon her preliminary trial trip on Saturday, June 22nd, down the river Ribble to Lytham, and gave every satisfaction to the owners and builders, attaining a high rate of speed. The engines worked without a hitch and their performance was very creditable. The principal dimensions of the vessel are 87 ft. long by 15 ft. by 6 ft. 9 in. on a 3 ft. 6 in. draught of water. The engines are compound, working at 120 lbs. pressure. Two sets (port and starboard) driving twin screws. The hull and engines were constructed under Board of Trade supervision. This vessel has been built

for the Oreston & Turnchapel Co.'s fleet of passenger steamers at Plymouth. The cabins are prettily painted in neutral colours, and the after cabin upholstered in crimson plush. The tables, &c., of polished mahogany, and the floors covered with linoleum. The deck fittings and cabins, companions, &c., are of teak and the finish throughout is of the best. The vessel has accommodation for about 800 passengers. The builders are Messrs. Allsup & Co., Limited, of Preston, Lancashire.

### NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from May 27th to June 24th, 1895:—

Armstrong, James, chief engineer to the *Champion*, to date June 8th.

Barnes, Benjamin J., staff engineer to the *Mars*, to date June 11th.

Chase, J. E., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Dart, Frederick H., engineer to the *Hussar*, to date June 6th.

Edgar, E. J., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.

Edwards, George K., engineer to the *Defiance*, additional, to date June 6th.

Egan, O. G., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet on the retired list.

Freak, William M., fleet engineer to the *Pembroke*, additional, to date June 20th.

Green, R. W., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.

Green, Richard W., chief engineer to the *Cordelia*, to date June 11th.

Griffen, Daniel, staff engineer to the *Scylla*, to date June 8th.

Hinchcliff, W. F., engineer to the *Revenge*, to date June 6th.

Hinchcliff, W. F., engineer to the *Mildura*, to date June 21st.

Hocken, W. T., chief engineer to the *Isis*, to date June 6th.

Jeffery, George H., assistant engineer to the *Hawke*, to date June 7th.

Matthews, W. H., fleet engineer to the *Gibraltar*, to date June 19th.

Meadus, W. H., chief engineer, has been advanced to the rank of staff engineer to Her Majesty's fleet.

Moore, C. A., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.

Pettit, W. J., fleet engineer to the *Victorious*, additional, to date June 20th.

Rattenbury, E. J., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.

Richardson, John, engineer to the *Vivid*, additional, to date June 6th.

Rush, H. O., engineer to the *Terrible*, to date June 4th.

Ryder, J. F., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Serle, R. T., staff engineer, has been placed on the retired list.

Stewart, W. H. W., engineer to the *Opossum*, to date June 6th.

Thomas, Elijah, staff engineer to the *Pembroke*, to date June 20th.

Turner, W. F., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.

Wallis, W. A. W., assistant engineer to the *Skipjack*, to date June 7th.

### Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from May 9th, to June 13th, 1895.

9162 E. Bennis. Steam boilers.

9168 S. Pitt (La Compagnie Internationale des procédés, Adolphe Seigle, France). Heating furnaces.

9169 E. J. Preston. Ships' water-closets.

9173 A. L. Forster. Steam engines.

9175 W. Holliday. Visible droop feed lubricators.

9199 G. F. Priestley. Steam generators.

9205 J. M. Gorham and A. V. Gifkins. Propelling boats.

9259 S. Hey (R. Peyre, France). Steam traps.

9280 E. Johnson. Trawl net for fishing purposes.

9284 W. Tijou. Water-tube steam boilers.

9324 D. B. Hutton. Boiler furnaces.

9348 H. Simpson and J. Taylor. Tubes for condensers.

9363 J. H. Loader. Propulsion of vessels.

9384 J. Marckmann. Boring salt from boiler tubes.

9400 W. Munro. Securing tubes in tube plates.

9403 F. E. Rainey. Boiler.

9404 J. A. Smith, J. Hart, and A. Wilkinson. Piston valve.

9407 G. Rodger. Packings of parts of engines.

9418 Caddy & Co., Limited, and L. Edwards. Furnaces.

9430 H. B. Hollis. Ferrule for connecting valves.

9449 J. E. Hodgson. Fire-bars for steam boiler furnaces.

9451 A. Rasic. Life-belts.

9459 A. F. Waterfield and J. Ball. Navigable vessels.

9466 W. H. Lindsay. Preventing racing of steamship propeller.

9495 C. Klemm. Lubricators.

9497 G. Burnett. Roller for use on fishing vessels.

9501 J. C. Merryweather. Armoured hose pipe.

9502 E. W. Beech. High-pressure boilers.

9517 A. Blechynden. Tubulous steam boilers.

9532 J. W. Holden. Lubricators.

9537 W. E. Harris. Sheet iron heating furnaces.

9557 J. E. Dery. Preventing priming in engines.

9572 J. C. B. Okes. Internal combustion engines.

9573 J. P. Hall. Water-tube boiler.

9588 E. Makin, jun. Steam boilers.

9590 G. Saunders. Drop keel or centre board.

9611 W. P. Thompson (F. Loos, Germany). Lubricators.

9613 M. Gehre. Tubular boilers.

9654 T. Burmeister. Furnaces.

9667 C. A. Williamson. Lifebuoy.

9676 J. Entwisle (E. K. Hill and J. H. W. Hoadley, United States). Steam engines.

9707 C. Herbert. Discharging water traps for steam vessels.

9710 A. Trassl and J. Trassl. Smoke consuming furnaces.

9712 W. P. Thompson (B. Wesselman and W. Böcker, Germany). Propeller for ships, &c.

9729 J. L. Dorian and J. A. Dorian. Steam heater.

9759 J. P. Jones. Spiral screw propeller.

9804 T. M. Witham and W. T. Hancock. Landing nets.

9819 B. C. Tanner. Automatic steam valve for pumps.

9840 H. F. Gade. Valves for reciprocating steam engines.

9845 J. J. Wagstaff. Propulsion of boats and vessels.

9853 E. F. Boulet. Piston and piston rod packings.

9912 J. Baker and A. Green. Injectors for steam generators.

9917 W. N. Scott and J. N. Beevor. Preventing damage to ships.

9975 J. Wharrier. Propellers for steam vessels.

9980 J. Brown. Rowlocks.

9981 A. E. Old. Motor generator.

10008 J. W. Parker. Steam boilers.

10016 H. W. Leslie, R. A. Carson, and the O. F. Zurn Co. Blow-off for boilers.

10032 J. and F. C. Carter. Safety valves.

10059 J. C. Chapman (A. Alieri, Italy). Tubular steam generators.

10077 S. H. Berry and J. C. Berry. Boiler indicator.

10080 J. Shaw. Lighting and ventilating ships.

10082 G. F. Priestley and W. S. Bancroft. Steam generators.

10084 J. McLachlan. Steam, &c., steering gear.

10115 R. Chambers. Life-boats.

10143 M. Gledhill. Armour plates or forgings.

10158 J. Tweedy. Balancing of steam engines.

10184 J. Woodward. Simplex steering lock.

10187 A. Cameron. Paddle wheels for ships, &c.

10234 A. Calmon. Flexible packings for flanges.

10251 W. Munro. Steam vessels.

10261 G. Dittmann. Water-tight doors for ships.

10267 J. M. Adam. Revolving vanes or propeller blades.

10302 C. C. Snell. Laying submarine cables.

10313 W. S. Smith and W. P. Granville. Submerged cables.

10324 G. C. Mackrow. Ships' fittings.

10385 J. Wilson. Boilers.

10396 A. J. Boulton (E. P. McGerr, United States). Steam boilers.

10441 J. Patterson and J. R. Sandilands. Steam boilers.

10453 H. McPhail. Steam generators.

10465 D. B. Morison and E. Gearing. Circulating water in boilers.

10436 J. D. Churchhill. Valves.

- 10481 F. Melton. Oars.  
 10482 G. Brooke. Refacing the seats of valves.  
 10494 J. Langfield. Fastening tubes into plates.  
 10498 J. Jackson. Steam generators.  
 10545 A. W. Bryce. Scraper for bottoms of vessels.  
 10559 E. Stillwell and A. Stillwell. Steel yards.  
 10560 H. W. Laird. Water-heating and steam-generating apparatuses.  
 10565 The Reeves' Patent Filters Co., Limited, and W. Reeves. Purification of water, &c.  
 10613 H. Mechan. Sliding watertight doors.  
 10637 C. E. Reeves. Anchors.  
 10647 A. G. New and A. J. Mayne. Electrical propulsion of boats.  
 10653 J. Walker. Packing for stuffing boxes.  
 10680 E. H. O. Ropner. Cargo-carrying steamers.  
 10686 A. T. and J. E. Hoopel. Sails.  
 10693 P. Collinson. Engine governor connections.  
 10696 J. H. Cox. Electro-plating ships, vats, &c.  
 10706 S. Farnsworth and J. A. Arnold. Furnaces for steam boilers.  
 10776 Davis & Co., Limited, and W. R. G. Hay. Regulating steam in engines.  
 10823 J. Giers. Apparatus for generating steam.  
 10847 J. W. McKinnon. Davits.  
 10880 J. B. Somers (H. McGilvray and A. Dray, New Zealand). Worm gear davits.  
 10896 H. W. Mackenzie. Steam engines.  
 10906 W. H. Rogers and R. J. Meek. Steering gear.  
 10907 A. J. Boul (A. Prolhac, junr., France). Valve gear.  
 10921 S. O. Davidson. Smoke-consuming furnaces.  
 10945 J. D. Ellis. Armour plates.  
 10949 C. A. de Lambert. Boats.  
 10954 E. H. O. Ropner. Cargo-carrying steamers.  
 10967 W. B. Crichton. Steam engines.  
 10982 J. Paton. Steam engine governors.  
 10984 J. Thom. Steam generators.  
 10990 J. Schofield. Steam boilers.  
 11001 M. F. Davis. Rowlocks.  
 11002 M. F. Davis. Oars or sweeps.  
 11031 H. U. Wollaston and G. P. R. Fell. Boiler feeding apparatus.  
 11033 H. Schneider. Armour plates.  
 11040 J. Jones. Inducing draught in boilers.  
 11054 W. T. Smith. Furnaces for steam boilers.  
 11065 R. Turnbull. Floating pontoon docks.  
 11067 T. W. Bailey. Water-tube firebars.  
 11068 R. Baird. Water-tube steam generators.  
 11096 H. Milward & Sons, Limited, and C. J. Bradshaw. Lubricating shafts.  
 11100 R. J. Wilkinson. Oars, sculls, paddles, &c.  
 11101 R. J. Wilkinson. Oars, sculls, paddles, &c.  
 11128 R. Hutchinson. Hydraulic apparatus for packings.  
 11133 J. Stephens and A. Stephens. Attachment for cables to submarine mines.  
 11145 G. J. Hopper. Screw-down cocks and valves.  
 11151 J. E. Bott and W. Pearson. Screw propellers.  
 11167 J. Kirkaldy. Apparatus for propelling boats.  
 11195 H. Grafton (W. R. Grafton, Egypt). Hopper dredgers.  
 11201 C. W. A. Taylor. Feed-water filters.  
 11205 D. Davies. Water-tube steam boilers.  
 11247 W. H. Lindsay. Stopping steamship engines.  
 11251 J. R. Robertson and A. D. S. Dalgliesh. Appliance for trawl fishing.  
 11253 A. Blechynden. Feed-water regulator.  
 11257 L. D. Cohn and W. D. Cohn. Wrenches.  
 11270 F. Willems. Ships' ventilators.  
 11286 F. B. Bedwell. Indicating the rotation of vessels.  
 11317 L. Richards. Turning steam into cylinders.  
 11348 C. Pelham. Rowlocks.  
 11402 W. P. Thompson. (O. Sondermann, Germany). Compound engines.  
 11420 W. P. English. Water-tube steam generators.  
 11425 W. T. Bothwell. Vessel-steering mechanism.  
 11431 H. T. Hawkins. Ships' logs.  
 11432 G. W. Green. An adjustable rule gauge.  
 11463 F. W. Golby. (Velu, France). Steam distributing valves.  
 11476 P. J. Pommée. Steam boiler flues and tubes.  
 11510 J. Thomas and H. Tanner. Stopping vessels.

## BOARD OF TRADE EXAMINATIONS.

NOTE.—1C denotes First Class; 2C, Second Class.

May 25th, 1895.

Abraham, T. T. 2C Cardiff  
 Banks, Hy. H. ... 2C "  
 Beck, Renwith. 1C "  
 Bowen, Dan. E. 1C "  
 Burton, Robert 1C Glasgow  
 Callender, John 1C W.H.'pool  
 Coe, A. E. .... 1C London  
 Farrar, J. W. ... 2C W.H.'pool  
 Fergusson, W. L. 2C Glasgow  
 Fisher, John H. 2C Cardiff  
 Fyfe, Robert S. 2C Dundee  
 Grant, A. E. ... 1C Cardiff  
 Griffiths, David 1C "  
 Hamilton, H. P. 2C Glasgow  
 Hendrie, Wm. ... 2C "  
 Henry, Benj. A. 2C Liverpool  
 Heronne, D. D. ... 2C Cardiff  
 Hill, Thos. R. ... 2C "  
 Hogg, John W. ... 2C W.H.'pool  
 Humbert, H. ... 2C London  
 Jelley, Harry ... 2C Cardiff  
 Kluge, Thos. E. 2C "  
 Lawson, Thos. ... 1C Liverpool  
 MacKillop, J. G. 2C Glasgow  
 Mansfield, W. J. 1C Cardiff  
 MacGregor, J. G. 1C Dundee  
 Mill, George. ... 1C Liverpool  
 Perrett, Alfred. 2C Cardiff  
 Rhynd, John ... 2C W.H.'pool  
 Rushworth, Hy. 2C "  
 Seddon, J. A. P. 1C Cardiff  
 Stewart, A. A. ... 2C London  
 Stewart, J. H. ... 2C "  
 Todd, Wm. W. 1C W.H.'pool  
 Turnbull, David 2C Dundee  
 Watson, J. H. ... 1C W.H.'pool  
 White, J. Mc G. 2C Dundee  
 Yealland, R. G. 1C Cardiff

June 1st, 1895.

Alexander, Wm. 1C Aberdeen  
 Ashton, Joseph 2C Liverpool  
 Barnes, John ... 2C N. Shields  
 Battey, R. F. ... 2C "  
 Blair, John ... 2C London  
 Boy, Joseph ... 2C N. Shields  
 Boyce, L. .... 2C "  
 Brunton, James 2C "  
 Burls, Charles. ... 1C London  
 Burn, E. O. ... 1C N. Shields  
 Cherry, T. R. ... 2C London  
 Cramer, John C. 2C Liverpool  
 Cree, G. A. .... 1C Hull  
 Curry, James ... 1C N. Shields  
 Denholme, D. ... 2C "  
 Dunlop, M. B. ... 2C London  
 Elliott, Alfred. ... 2C N. Shields  
 Findlay, James 1C Aberdeen  
 Goate, William. 2C N. Shields  
 Gordon, A. C. ... 2C Aberdeen  
 Howard, A. .... 1C Hull  
 Lawton, A. .... 1C London  
 Lawin, Wm. J. 1C Liverpool  
 Mathieson, M. P. 1C N. Shields  
 McGregor, Wm. 2C Aberdeen  
 Metcalf, H. E. ... 1C London  
 Mowat, David. ... 2C Aberdeen  
 Muddleton, C. ... 1C "  
 Newrick, J. M. ... 2C N. Shields  
 Newton, Arthur 2C "  
 Raahange, S. A. 2C Hull  
 Richards, H. ... 1C Falmouth  
 Robertshaw, L. 1C N. Shields  
 Robertson, Wm. 1C London  
 Shields, John ... 1C Hull  
 Smith, Charles. 2C N. Shields  
 Smith, James C. 2C Aberdeen

Starling, S. E. ... 1C N. Shields  
 Thomas, R. .... 2C London  
 Walker, John ... 2C Hull  
 Watson, T. H. ... 1C London  
 Willson, A. T. ... 2C "  
 Wishart, James 1C N. Shields

June 8th, 1895.

Anderson, Robt. 2C Dublin  
 Atkinson, W. L. 2C Liverpool  
 Batchen, D. McK. 2C Glasgow  
 Binks, C. S. .... 2C Hull  
 Brown, James ... 2C Liverpool  
 Coulter, A. P. ... 1C London  
 Cunningham, J. 1C Glasgow  
 Cuthbert, Wm. 2C Leith  
 Denny, J. L. ... 1C Glasgow  
 Diamantopulos, N. 2C Cardiff  
 Dickinson, W. L. 1C London  
 Ditchburn, T. A. 2C "  
 Farr, G. O. .... 2C Cardiff  
 Fisher, Thos. ... 2C Leith  
 Fraser, Wm. ... 1C Cardiff  
 Gould, Henry ... 1C Liverpool  
 Hedley, W. G. H. 1C London  
 Henderson, A. M. 1C Glasgow  
 Hobson, A. .... 2C Hull  
 Houston, H. E. ... 2C Cardiff  
 Keene, Richard 1C London  
 Kelly, Albert ... 2C Cardiff  
 Mackenzie, G. A. 2C Glasgow  
 McClure, S. J. ... 1C Dublin  
 McConochie, J. L. 2C Cardiff  
 Morrison, S. K. ... 2C Dublin  
 Murray, D. .... 2C Glasgow  
 Murray, Ronald 1C Liverpool  
 O'Neil, Geo. ... 2C Dublin  
 Oxtoby, J. C. ... 2C Hull  
 Pink, Wm. Jas. 1C London  
 Reed, Thos. .... 1C Cardiff  
 Rule, John ... 2C "  
 Seed, Fred E. ... 2C Glasgow  
 Starkey, A. E. ... 2C Hull  
 Tate, Thos. .... 2C London  
 Thomson, Daniel 1C Liverpool  
 Turner, Wm. P. 1C "  
 Williamson, John 2C Glasgow  
 Wylie, Ephraim 2C "

June 15th, 1895.

Angus, J. L. ... 2C N. Shields  
 Baile, R. O. .... 2C Liverpool  
 Corlett, A. R. ... 2C "  
 Craigie, A. H. ... 2C London  
 Cuthill, William 1C "  
 Dalgetty, A. ... 2C Dundee  
 Dix, J. F. .... 2C N. Shields  
 Dixon, W. H. ... 2C London  
 Dryden, James 1C Dundee  
 Duncan, A. .... 2C N. Shields  
 Dunn, George. ... 1C "  
 Henry, George. ... 2C Dundee  
 Higginbotham, W. 2C Greenock  
 Hood, Thomas ... 1C N. Shields  
 Martin, W. S. ... 1C "  
 MacNab, T. F. ... 1C Greenock  
 Neill, Hugh ... 2C London  
 Norris, F. .... 2C "  
 Oliver, J. G. ... 2C W.H.'pool  
 Peat, Norman D. 1C Greenock  
 Plenge, T. .... 2C N. Shields  
 Reay, J. H. .... 1C W.H.'pool  
 Ruddocks, Thos. 1C Greenock  
 Shotton, T. R. ... 2C N. Shields  
 Slater, F. A. ... 1C London  
 Stevenson, J. S. 2C W.H.'pool  
 Thoms, Wm. ... 2C N. Shields  
 Wallace, John ... 2C "  
 Wilkinson, E. ... 1C W.H.'pool



# The Marine Engineer.

LONDON, AUGUST 1, 1895

THE Chamber of Shipping of the United Kingdom at their annual meeting in February last, brought forward a most important resolution with the object of making the Marine Department of the Board of Trade "a real Board, consisting of responsible men cognisant of the requirements of the shipping interests of the community." As this would imply a Board largely constituted of those members of the shipping community who are themselves supposed to be controlled and are indubitably most frequently unnecessarily harassed by the Board of Trade, it is hardly likely that such a drastic resolution would find favour with a Government Board, who must be disinterested if anything at all. But the alternative part of the resolution, that a consultative shipping council be constituted by Parliament, to consist, besides official members, of representatives of the shipping interests, and to act as advisers of the Board of Trade in all matters connected with proposed legislative and administrative changes affecting the duties of the Department, is much more likely to be within the range of practical politics. In fact there is a splendid precedent for such a board of advisers to an administrative Board, viz., Lloyd's Committee. It is well known that since the adoption by the Society of Lloyd's Register of Shipping of a consultative committee of representatives of the shipbuilding and marine engineering trades, the rules and regulations of the Society have been much more cheerfully acquiesced in by the shipbuilders and engineers. Peace and contentment have generally prevailed, and much unnecessary friction and recrimination have been avoided without loss of efficient supervision and control. Why should not the Marine Department of the Board of Trade see their way to benefit by all technical advice and even criticism from those who know the requirements and practical limitations of the shipping trade, before as a Board they promulgate their responsible rules and regulations. It is the greatest mistake that an autocratic Government Board should ever commit themselves to any arbitrary rules and regulations that may be subject afterwards to fair criticism after their promulgation that they are unwise or even impracticable, and yet this position is by no means unknown, or even unacknowledged, at present. By all means let such a Board have all the fair criticism and advice that they may be able to get before committing themselves to hard and fast regulations. When once they have passed the

criticism of such a consultative committee, they are more likely to be cheerfully acquiesced in by the shipping trades, even when drastic in their character, when it is known that they have been already fully discussed as to *pros* and *cons* by those who, of their own knowledge, are aware of the difficulties that may have to be encountered in carrying them into practical effect. Beyond, however, the consultative duties of the committee before regulations are promulgated, we cannot see that it will be practicable that the committee can advantageously interfere with the administration of such regulations. That would be too much like defendants becoming their own Judges. But by all means let them have the full opportunity of special pleading, before the Board are committed to hard and fast rules and regulations.

THE question of watertight doors in bulkheads is still an unsettled one. That a considerable number of transverse watertight bulkheads, both for all vessels of the Mercantile Marine and for those of the Navy, is a necessity, is generally recognised; but how such bulkheads, if pierced with doors and apertures, are to be rendered immediately and promptly watertight in the sudden panic of a collision, is a question that does not appear to have been satisfactorily settled. The sad disaster to the *Victoria* has but emphasized the fact that doors are apt to be forgotten or neglected, or won't work at the critical moment. Curiously enough, a very simple solution of this vexed question has been in practical existence for some time in the Paris and New York steam ships. In these steamers there have never been any doors at all in the watertight bulkheads. The argument then that all passenger ships must have such watertight doors is evidently controverted by these examples. That the absence of doors will occasion some inconvenience to passengers and crew is obvious, as the only communication between the compartments is from deck. The security, however, of the system should be so obvious, both to passengers and crew, that we do not suppose the inconvenience is much grumbled at, or if so, may be disregarded. The *Paris*, as is well known, four years ago met with an accident in the engine-room, which caused that compartment to be flooded, but as there was no door of communication with the boiler-room, this compartment, so all-important on board ship, was saved. A compartment abaft the engine-room was also flooded by injury to the bulkhead, but the flooding was absolutely limited to the injured compartment, and the vessel floated. The United States Naval Board, however, do not seem to favour this very simple solution of the matter, as we hear that their engineer staff are about to test, on

board one of the new American warships, several mechanical devices, operated either by compressed air or electricity, to close all bulkhead doors instantaneously from the conning tower or bridge. The officer on deck or in the conning tower, on seeing a collision imminent, can, by simply pulling a lever, close all doors simultaneously, a warning bell or whistle being given at the same time to warn those below that the doors are being closed. The results of the tests will be interesting.

### THE NICLAUSSE WATER-TUBE BOILER.\*

By MARK ROBINSON, MEMBER.

1. So much importance attaches now to the subject of water-tube boilers, that the following notes may be of interest to members. It must be understood that the writer claims no such intimate knowledge either of the Niclausse boiler, or of water-tube boilers in general, as would enable him to speak with

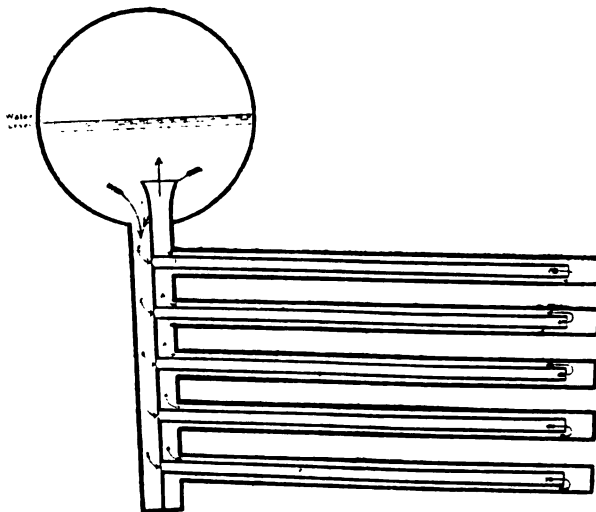


FIG. 1.

authority upon their respective merits, but he has had occasion to satisfy himself upon various points connected with the former.

2. The Niclausse boiler was described briefly in Mr. Milton's paper on Water-Tube Boilers, read before the Institution in March, 1894, but it will be useful to describe it more fully here. In general design it recalls the well-known Babcock & Wilcox boiler, in that it has water tubes slightly inclined from the horizontal, which deliver, by a number of ascending headers at the front of the boiler, into a water and steam drum at the top. In the Babcock & Wilcox boiler the drum extends from back to front, and at the rear end there are descending headers which take the water to the lower, or rear, end of the tubes, and thus maintain circulation.

3. In the Niclausse boiler there are no rear headers: the water tubes are closed at the back end, but circulation is maintained by making the front headers *double*, that is, there is a vertical division in them, dividing them into front and rear portions; the tubes are fixed in the rear part of the header. In each tube is an inner tube, which reaches nearly to the back end of the main tube, and which, in front, comes as far forward as the division referred to. The front portion of the header provides for the descent of the water from the drum; thence it passes along the inner tubes to the back end; returns by the outer tubes; ascends by the rear portion of the header; and delivers into the drum. The circulation is shown graphically in

Fig. 1. It will be seen at once that the boiler is in principle a modification of the Field boiler, with inner circulating tubes.

4. It is an obvious advantage of this construction that the various joints, &c., are brought to the front of the boiler, but there would, perhaps, be not much gain from this if the tubes were expanded into the headers in the usual way. They are, however, fixed by a remarkable joint which allows of almost instant removal, so that they can be, not only examined, but also drawn out through the front. The details of this arrangement will be referred to presently.

5. Another advantage of what may be called the "one-header" system, is that by making an easily-broken connection between the header and the drum, the header, with its associated



FIG. 2.

tubes, can be dealt with as a single "element," and removed as a one piece—though in practice it is so easy to remove the tubes separately, that it is more convenient to take out the tubes from the header before removing the latter. It may be said, moreover, that the removal of a header is very rarely required: all purposes of cleaning are fulfilled by removing the tubes.

6. The method of jointing the tubes will be seen from Figs. 2, 3 and 4. Fig. 2 gives an external view of a tube complete. It consists of two parts, permanently connected, namely, the iron or steel tube T, and the "lantern" AB, the latter being a malleable iron casting. The tube is thickened at the end B, and screwed into the "lantern" with a fine thread. B (of larger diameter than the rest of the tube) is turned to a slight taper, and fits a similarly tapered hole in the back of the header. At D the lantern is cylindrical, and slightly larger than any part of the taper B; D is an *easy* fit in a hole in the internal vertical diaphragm, which divides the header into two parts. A is also tapered, its smallest diameter being larger than D; it fits into a coned hole in the front of the header; thus the entire tube can be withdrawn from the front. The several cones, &c., as well as the holes in the header and its diaphragm, are made strictly concentric. The front end of the header is provided with ears or projections for pulling it out by, and there is in it a large central hole, threaded. Into this screws the plug C (see Fig. 3), which, by means of another smaller and slighter "lantern" carries the inner tube. At E the inner tube fits easily in a bored division in the outer lantern, inside D. In Fig. 2 the solid part of the inner tube is seen through the right-hand opening, G, of the main "lantern"; the left-hand opening, H, showing only the thin edge of the lantern piece of the inner tube. (The inner tube is of very light construction, not being exposed to pressure.) It will be seen on reference to Figs. 2 and 4 that, as already mentioned, the inner tube is able to receive water from the front half of the header through H, and that the same water, with steam, returning from the far end of the inner tube along the outer tube, is able to deliver into the back, or ascending header, through the openings G. So long as the length of the outer tube is not excessive, there is good support for it in the header; it may be mentioned, however, that the weight of the rear extremity of the tube is borne by entering it loosely in a hole in a plate at the back of the combustion chamber. If only a few



FIG. 3.

of the tubes take a bearing in this plate, it is sufficient to relieve the header from weight. Fig. 4 shows both tubes in section, with the coned and other seats in the header. It need not be said that with tubes held at one end only, there is complete freedom from troubles due to unequal expansion.

7. It will be noticed that the rear end of the outer tube is closed by a screwed cap, the removal of which, when the tube is taken out, renders the operations of cleaning still easier. In land boilers, if there is plenty of space, access is arranged at the rear of the boiler, so that the caps can be taken off from behind; but this is not important. Inspection of the tubes is usually performed by merely unscrewing and removing the inner tube; but it is almost as little trouble to withdraw the complete tube.

\* Read at the Thirty-sixth Session of the Institution of Naval Architects, Paris, June 13th, 1895.

8. Owing to the slightly greater area of the front cone, the tubes have, theoretically, a tendency to come out under the boiler pressure only. As a fact, the friction of the cones in their seats is sufficient to hold them in place; but to make sure, clamps are provided, each of which secure two tubes. The arrangement is clearly shown in Fig. 5, which is a perspective view of one header with tubes—one "element," in fact. Fig. 6 shows the clamps removed, and the process of unscrewing one of the inner tubes; it also shows one of the latter partly withdrawn. In Fig. 7 one of the large tubes is shown partly withdrawn, also the operation of lifting it from its seatings by a kind of hooked lever placed under one of the ears. This is the plan followed with the French-made boilers; but the English makers have adopted a slightly more elaborate tool for lifting the tubes, which applies the pull in the line of the axis of the tube, and avoids uneven pressure. It is to be noted that the cone B, in Figs. 2 and 4, is turned out of the thickened part of the main tube, and is not a part of the malleable cast "lantern." This makes it impossible for the tube to draw out through the hole, under the steam pressure: its safety is not dependent upon its connection with the lantern.

9. A somewhat similar arrangement of coned joints connects the headers with the drum above. The two are drawn together by bolts and nuts, and a double-ended cone-piece enters seatings in both the drum and the header. Apart from other merits, this system of connections facilitates both the erection of the boiler by unskilled labour and the easy transport of the parts.

10. With tubes which are fixed by one end only, it is obvious that they cannot be very long, and in fact about seven feet is the extreme length. The length of the tubes approximately corresponds with the length of the grate, and does not admit of more than one "pass" of the gases amongst them; there is no opportunity to take the gases first up and then down again amongst the tubes. The boiler is therefore a short one from back to front, and, apart from the thickness of the containing walls, its fire-grate is practically as large as the whole floor space the boiler occupies. The shortness of the tubes also makes easy the cleaning of their external surfaces. Every part of them is easily reached from the front by a portable steam jet while the boiler is steaming—a fact which tells very favourably upon the efficiency of the boiler in continuous work.

11. When the Niolaussé boiler was brought under the notice of the writer and his colleagues, some two years ago, they were naturally struck with the advantage of a plan which made every part so readily accessible for cleaning, and which admitted of tubes being withdrawn and replaced by new ones made interchangeable, literally in a few minutes. The readiness with which interchangeableness could be secured in the parts, and the extraordinary facilities for repairs, also appealed strongly to engineers accustomed to repetition work on a large scale. But notwithstanding much evidence of successful work in France, they could not but feel grave doubts on four important points, viz.:

The continuous tightness of the cone joints under all conditions of temperature and pressure;

The freedom of the boiler from injurious deposits in the tubes;

The evaporative efficiency, seeing that the gases could pass but once between the tubes, and might be expected to go away very hot; and

The dryness of the steam—

and they decided to have a French-made boiler, and to subject it to long and practical tests. As their primary object was the possession of a good and reliable boiler for electric light stations and other works on land, they ordered a land boiler rated at an evaporation of 1,000 kilogrammes per hour, or about 2,200 lbs.—an evaporation easily attained, on trial, by the combustion of only 13½ lbs. of coal per foot of fire grate.

#### Tightness of Cone Joints.

12. The boiler was under trial at Messrs. Willans & Robinson's works at Thames Ditton, more or less continuously, for over a year, before it was decided to take up the manufacture in England, and in that time all doubts as to the efficiency of the cone joints, under a pressure of 200 lbs. per square inch, were disposed of. The writer must admit that it seemed to him at first almost incredible that both the front and rear cones should take a perfectly tight bearing together, and retain it under all variations of temperature, but they did so invariably, and practically no leak was ever seen in any joint of the 108 tubes of the

boiler. After a year's trial, partly in ordinary working; partly in tests of various kinds, involving frequent withdrawals of tubes; partly in standing idle, the joints were as good as at first. The screw-plugs carrying the inner tubes, and the screw-caps on

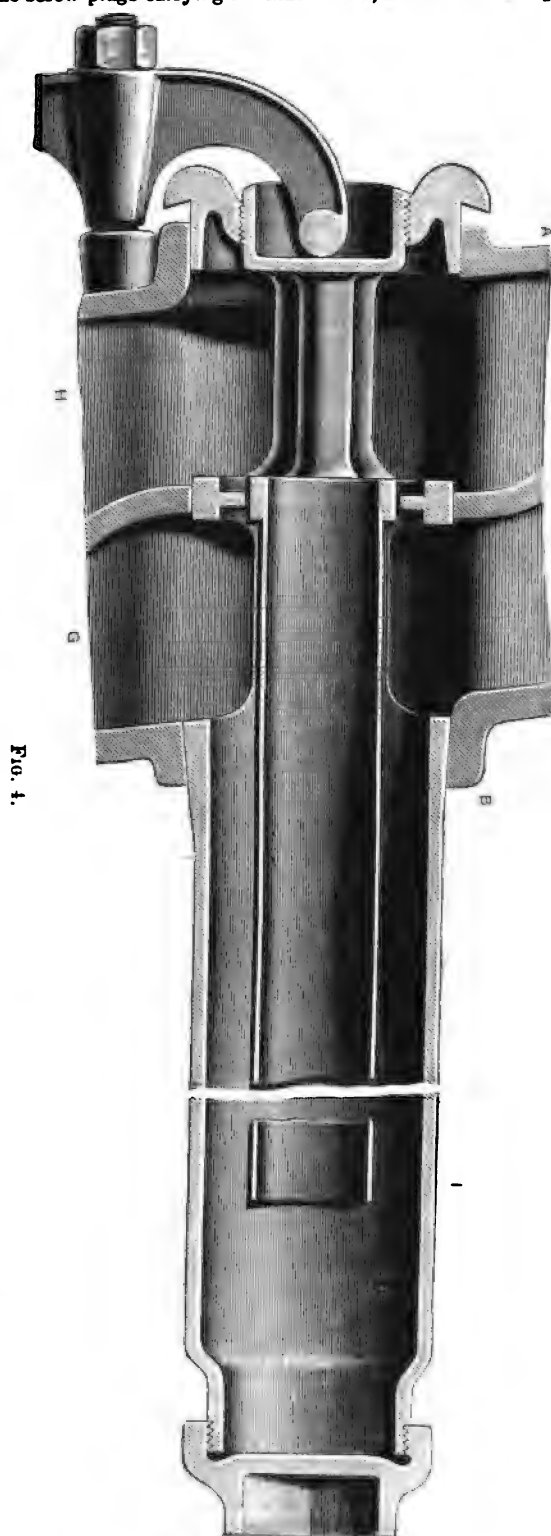


Fig. 4.

the larger tubes, were equally free from leakage. Anti-corrosion grease is used upon the cones, screw-threads, &c., when they are put together, and again directly they are removed, and importance is attached to this by the inventor.

13. As regards ease of removal, the writer has several times seen the fire drawn and the boiler blown out, the latter being at the time full of water and under 200 lbs. pressure; one or more tubes removed, inspected, and replaced; and steam got up again to 200 lbs. within a few minutes over the hour. Even this time was longer than would have been required, had it not been necessary to blow out through a very small pipe.

#### Freedom from Deposit.

14. In this respect also, the trials at Thames Ditton were satisfactory. The writer had been prepared to accept the view that the advantages of water-tube boilers, at least for some purposes, must ensure their use even if they were proved to require more frequent cleaning than ordinary tubular boilers, provided only that the cleaning were made easy enough, and he considered that, with inspection and cleaning made so easy as it is in the

worked, though not continuously, for three or four months, and at the end of that time the deposit in the tubes, though hard, and of course greater than was desirable, was by no means very large in quantity. It was when in this condition that the evaporation trials, to be presently referred to, were made.

15. It is not suggested that the foregoing experiences are conclusive with regard to marine work, in which the difficulties are different in kind, but they show generally that the boiler has little natural tendency to throw down deposit in the tubes. It may be here mentioned the boiler was worked for a fortnight with the smokiest kind of North-Country coal, specially procured, but that no difficulty was experienced in keeping the tubes externally free from soot while the boiler was doing its ordinary work. This test was regarded by the writer as a specially important one, in view of the difficulty which effectual cleaning involves in some types of water-tube boilers.



FIG. 5.

#### Evaporative Efficiency.

Niclause boiler, even a considerable tendency to deposit need not be a bar to its use. But trial proved that the boiler is really very free from this tendency, perhaps partly because of the quick circulation due to the "Field" tubes; partly because of the means taken to throw down the deposits of lime, &c., upon first entering the boiler, in a place whence they can be easily removed. The feed-water is delivered through the steam space into a receptacle in the drum, in which (being heated by passing through the steam) it throws down its salts, before overflowing into the drum itself. The receptacle is arranged for easy and frequent blowing off, and it is accessible through a hand-hole, for the removal of the more solid deposit. The boiler at Ditton was at first fed with Thames water direct from the river, and afterwards with Thames water from the mains, which, though still hard, had lost the organic matter which keeps the deposit from unfiltered Thames water soft and easy to remove. As the tubes remained surprisingly clean, even when the boiler was worked for a fortnight with the blow-off cocks closed, and also later, when a measured quantity of oil was passed into it daily, the receptacle above referred to was removed from the drum, and the feed-water was sent into it direct. The boiler was then

16. Trials made at Thames Ditton, under ordinary working conditions, gave an evaporation of from 10½ to nearly 11 lbs. of water (from and at 212 deg.) per pound of Welsh coal. This result was so contrary to the expectations of the writer that, although there was every reason to accept the trials as accurate, it was decided to check them by further trial by an independent authority, and Dr. A. B. W. Kennedy, F.R.S., and Professor W. Cawthorne Unwin, F.R.S., were requested to carry out a test. This trial was not intended to bring out maximum results for publication, and the boiler was not cleaned or in any way prepared for it; in fact, it was even overlooked at the time that, for the reason stated in paragraph 14, the tubes had more deposit in them than should be present under ordinary circumstances. The coal was not of the highest quality, and good as were the results of the trial, it is obvious that better might have been obtained. They at least proved that the single pass of the gases amongst the tubes was not to be reckoned as a drawback, and that the Niclause boiler could compare favourably with others in regard to economy. The results of two trials at normal output (2,200 lbs. per hour) and of one at an output exceeding the normal by 89 per cent., were as follows:—

	Two trials at Normal Evaporation (2,200 lbs. per hour).		Trial at Increased Evaporation of 4,113 lbs. per hour.
Feed-water per pound of coal ... .. lbs.	8.67	8.69	8.53*
do. from and at 212° ... .. "	10.47	10.50	10.34*
do. per lb. of carbon value, from and at 212° ... .. "	10.95	10.98	10.82*
Coal burnt per sq. ft. of grate per hour ... .. "	13.5	13.3	25.6*

\* Figures in this column to be taken as approximate only, as the trial lasted only three hours. The other trials lasted about 7½ hours.



A copy of the Report is annexed as an Appendix, with tables. It must in fairness be borne in mind by the reader that it was not a trial under the best trial conditions, but very much the reverse—which possibly adds to its value.

17. Perhaps the most striking fact was the very small reduction in the evaporative efficiency when the output was nearly doubled, and when the mean temperature of the chimney gases rose from little over 500 deg. Fahr. to 732 deg. Fahr. As pointed out in the Report, the combustion at this time, though obtained from steam jets, might equally well have been obtained with a chimney able to give a draught equivalent to 0.75 inches of water. It must be remembered that the grate is large relatively to the size of the boiler (an advantage shared, of course, by all water-tube boilers of what may be called the single-pass type), and that consequently a combustion of 25 lbs. per square foot of grate corresponds with a higher rate of combustion in a boiler in which the grate is relatively small.

18. A few months ago the trial boiler was removed from Ditton to the works of Messrs. Humphrys & Tennant, of Deptford, who fitted it with a casing of marine pattern, and built round it a structure representing a closed stoke-hold, in which trials could be carried out under forced draught. The best results obtained at Ditton were repeated without difficulty, and when burning as much as 85 lbs. per square foot of grate, the evaporation, from and at 212 deg., was 9.59 lbs. of water per pound of actual coal burnt during a four hours' trial. By the kindness of Messrs. Humphrys & Tennant the writer is enabled to include a table giving particulars of a series of trials at their works. It

#### Dryness of Steam.

19. This is sufficiently dealt with in the Report of Dr. Kennedy and Professor Unwin, who summed up the results by saying that "in all cases the amount of actual priming was so small as to be quite negligible." The absence of priming under the assisted-draught trial is remarkable; it did not exceed 0.14 per cent. In the other trials it reached on one occasion 0.43 per cent. The total moisture in the steam (not merely boiling water projected into the steam, which alone constitutes true priming) was found by the wire-drawing calorimeter to be about 1 per cent. (highest 1.2) in the trials at normal output, and there is no reason to assume that it was larger in the assisted-draught trial.

20. The most interesting trials of the Niclausse boiler, from the point of view of this Institution, are those on the French cruiser *Friant*, but here unfortunately we pass beyond matters within the writer's own knowledge. Moreover, in the halls of our kind and hospitable entertainers, from whom we have so many things to learn in the peaceful application of the engineering arts, it would neither be right of us to ask detailed information upon such a subject as the trials of war-ships, nor, if such information were generously given, would it be fitting to publish it. It is believed, however, that there is no impropriety in saying that the 20 boilers of the *Friant* weigh, including casings, firebrick linings, steam drums and valves belonging to the boilers themselves, not quite 200 tons. To this must be added 10.5 tons for the uptakes, and 45.4 tons for water. The chimneys (three in number) are not included in these weights.

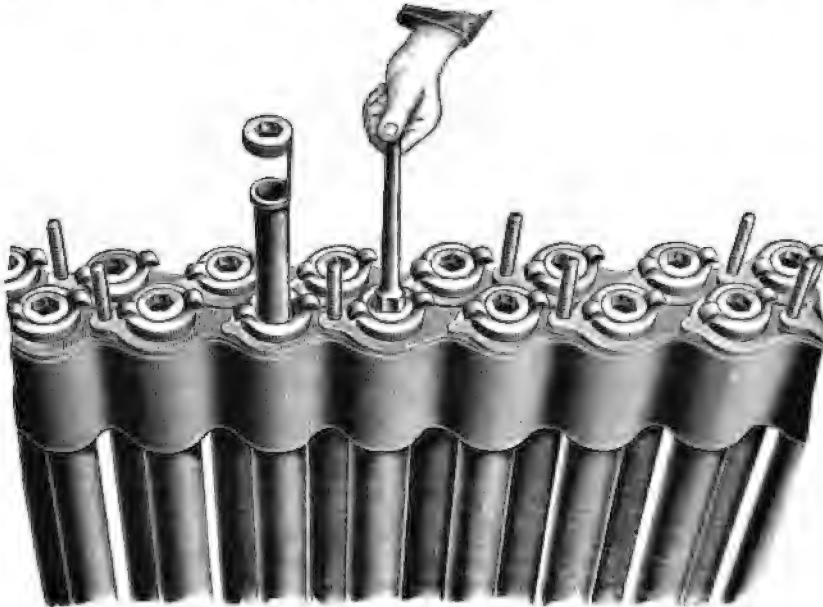


FIG. 6.

will be noticed that better results were obtained than in the trials by Dr. Kennedy and Professor Unwin, owing to the boiler being in cleaner condition.

Including water, the total weight comes out at less than .33 ton per square foot of grate. The larger boilers, of which there are four, have three fire doors, but only two large doors above,

#### TRIAL OF NICLAUSSE BOILER BY MESSRS. HUMPHRYS, TENNANT & CO.

GRATE AREA 19.2 Sq. Ft.

Date of Trial.	Duration.	Steam Pressure.	Temp. of Feed.	Coal Burnt per hour.	Coal per hour. Per ft. of Grate.	Water Evaporated per hour.		Water per lb. of Coal.	
						From Feed Temp.	From and at 212°	From Feed Temp.	From and at 212°
15 March	8 hours	165.4	71.3	864	18.96	3368.89	4030.81	9.25	11.06
20 "	8 "	171.0	60.4	248½	12.94	2307.68	2789.08	9.28	11.20
25 "	4 "	171.5	58.2	672	35.0	5329.78	6454.21	7.98	9.59
29 "	8 "	169.3	69.5	560	29.2	4630.92	5552.31	8.27	9.90
5 April	8 "	170.8	60.4	486	25.31	4212.83	5091.59	8.66	10.45

exposing the 12 headers, or elements, composing the boiler. Each header contains 18 tubes, or 216 in each boiler. The outside diameter of the tubes is 3.22 inches, but one tube in each header is special, and has a diameter of 2.95 inches only. The length of each tube is about 7 ft. 4½ inches. The length of grate is 6 ft. 6½ inches, and its surface 45.75 square feet. The heating surface in each large boiler is 1,340 square feet. There are 16 smaller boilers, each containing 10 headers, or elements, instead of 12, the total grate area of the 20 boilers being 775 square feet, and the total heating surface 23,200 square feet.

21. The evaporation, upon the trials of the vessel, is of course not known, but 9,438 I.H.P. was obtained upon a four hours' trial, with a combustion of coal of 25 lbs. per square foot of grate only, this low rate being due, of course, to the relatively large area of the grate and to the economy of the engines and boiler combined, even at this high power the consumption of coal being only 2 lbs. per I.H.P. per hour. Assuming 9 lbs. evaporation (which seems quite reasonable, in view of the trials at Thames Ditton and at Deptford), there would be an hourly evaporation of about 174,000 lbs. of water, or about 3 lbs. of water for each pound weight of boilers, including uptakes and water in the boilers.

22. It is also permissible to give the following general results in connection with the trials of this ship. Six trials were made under conditions, and with the results stated below:—

Trial.	Conditions of working and stipulated performance.	Actual results obtained.
1. Consumption Test ... ..	I.H.P. to be about 3,500; consumption of coal per I.H.P. hour to be between 1.54 and 1.76 lbs.	I.H.P. 3,657; consumption of coal per I.H.P. hour, 1.46 lbs.
2. Consumption Test ... ..	I.H.P. to be about 1,500; consumption of coal per I.H.P. hour to be between 1.65 and 1.87 lbs.	I.H.P. 1,624; consumption of coal per I.H.P. hour, 1.58 lbs.
3. Consumption Test ... ..	I.H.P. to be about 7,000; consumption of coal per I.H.P. hour to be between 1.87 and 2.09 lbs.	I.H.P. 7,189; consumption of coal per I.H.P. hour, 1.89 lbs.
4. Maximum Power Test ... ..	Total power, 9,000 I.H.P.; consumption of coal to obtain this power not to exceed 30.67 lbs. per sq. ft. of grate surface per hour.	I.H.P. 9,438; consumption of coal 24.94 lbs. per sq. ft. of grate surface per hour.
5. Firing Test ... ..	Twelve boilers only to be used; the boilers to be able to burn at least 30.67 lbs. of coal per sq. ft. of grate surface per hour.	Mean combustion, 32 lbs. of coal per sq. ft. of grate surface per hour. (It is worthy of remark that one boiler burnt 35.98 lbs. per sq. ft. of grate surface per hour throughout the whole trial.)
6. 24 Hours' Trial at Normal Power ...	During first period of 6 hours the minimum power to be 6,000 I.H.P., and for two hours to be not less than 8,500 I.H.P. For second period of 18 hours the mean power to be 6,000 I.H.P., and the coal consumption to be between 1.76 and 1.98 lbs. per I.H.P. hour.	Mean I.H.P. for six hours, 7,826, for three of which the power was 8,547 I.H.P.  Mean I.H.P. 6,279; consumption of coal 1.84 lbs. per I.H.P. hour.

23. Two points are reported as worthy of remark in connection with these trials. The first is that in none of them was there any flame in the funnels, nor excessive heating in the casings, showing the efficient combustion of the gases, and the completeness with which the heat in them was absorbed by the tubes. The second is that all the trials were made without any injection of air above the grate, a point of some importance as affecting the cost and complication of the installation. It is also stated that there was not a single leak found throughout the trials, nor was there any bending of tubes under the heaviest forcing.

## APPENDIX A.

REPORT BY DR. A. R. W. KENNEDY, F.R.S., AND BY PROFESSOR W. CAWTHORNE UNWIN, F.R.S., ON  
TRIALS OF A NICLAUSSE BOILER,  
IN APRIL AND MAY, 1894.

At the request of Messrs. Willans & Robinson we have made a number of experiments on the boiler constructed on the Niclausse system, which is set up at Thames Ditton, and give the principal results in the following report:

The Niclausse boiler is a boiler of tubular type which may be most concisely described as consisting of a number of tubes, resembling Field tubes, but placed at an angle of about 6 deg. to the horizontal, and so connected at the front end that the inner and outer tubes communicate with separate headers. The water in the outer tube, being the hotter, rises through the inner headers to the steam drum at the top of the boiler, and circulation is maintained by a descent of water through the outer headers, which communicate with the inner tubes, the front and back headers being separated by a vertical diaphragm, through which the inner tubes pass. At the joints between the tubes and headers, the parts are turned and bored so that the tubes can be withdrawn and replaced with facility.

In the boiler which we tested, the outer tubes were 3.22 in. diameter and 7 ft. long; the inner tubes were 1.5 in. diameter, and extended nearly the whole length of the outer tubes. The total external tube surface in the boiler was thus 649 sq. ft. At the top of the boiler was a steam drum 3 ft. 3 in. diameter, and 6 ft. 6 in. long. The boiler was set in brickwork, and was standing entirely separated from other erections on a wharf beside the river, a condition of affairs which can hardly have tended to reduce the radiation losses.

The points on which we have been specially asked to report are the evaporative efficiency of the boiler, and its output in proportion to its bulk. In the following report these points will be found to be dealt with.

The evaporative trials took place on the 10th and 11th April, and the 12th of May. It has turned out that two earlier trials



gave almost absolutely identical results. The second one was made because of an accident to a spring balance, just at the close of the first, which at the time we thought might possibly have vitiated its results in some way.

The water was measured out of a tank which was carefully calibrated before and after the trial. The time at which each 500 lbs. of water passed into the boiler was noted.

The coal was measured by the direct weighing of sacks of 100 lbs. net each, and the time noted at which firing from each 100 lbs. weight commenced and ended.

The steam pressure gauge was checked against a mercury column by Prof. D. S. Capper, of King's College, and the necessary (small) corrections have been made in the figures given below.

Samples of the furnace gases from the chimney were collected on each trial for analysis and samples of steam were also taken for the determination of priming, both by a withdrawing Calorimeter and by salt test.

The whole of the pipes in the boiler which were not in use were either opened out to the air or blanked off before the trials commenced.

Table I. shows the principal results of three evaporative trials. On the 10th and 11th April the trials were made at what was considered the normal full output of the boiler. On the 12th of May a special trial was made, by our request, to find how far the boiler could be forced by the use of steam jets without causing any appreciable amount of priming to occur.

Confining ourselves in the first instance to the trials under normal conditions, it will be seen that the duration of each test was about 7 hours and 20 minutes, and that coal was burnt (with ordinary hand firing) at the rate of about 13·4 lbs. per square foot of grate per hour.

In each trial, 16,000 lbs. of water was pumped into the boiler. In the one, 1,845 and in the other, 1,841 lbs. of coal were burnt. The actual evaporation was thus 8·68 lbs. of water per lb. of coal, which corresponds to an evaporation of 10·96 lbs. of water under standard conditions per pound of carbon-value of fuel.

Table II. shows the heat balance for the trials, and from this it will be seen that 73 per cent. of the total heat of the fuel was utilized in steam generation. There was a certain amount of loss in each case by imperfect combustion. In each case the largest loss was in the waste gases carried away up the chimney. The amount of heat thus lost averaged about 17 per cent. in the two trials. The figures in Table II. are of course entirely based on the gas analyses given in Table IV., which have been made for us by Mr. C. J. Wilson, F.C.S., and their exactness depends on the exactness with which the samples of gases collected during the trials really represent the average condition of the gases throughout its whole duration. It is of course impossible to suppose that the results are quite accurate, but the close correspondence between the two days indicates that they must be very approximate.

TABLE I.  
PARTICULARS OF TRIALS.

	DATE OF TRIAL.		
	April 10th.	April 11th.	May 12th.
Hour at which steam pressure got up in boiler ... ..	6 30 a.m.	6 15 a.m.	—
Weather ... ..	Very fine	Very fine	Very fine
Barometer (mean) ins....	30·14	29·94	30·09
Time of starting trial ...	9 10 a.m.	9 9 a.m.	9 53 a.m.
Duration of trial ...	7 27 hours	7 40 hours	2 95 hours
Total water evaporated	16,000 lbs.	16,000 lbs.	12,134 lbs.
Total coal burnt ...	1,845 lbs.	1,841 lbs.	1,422 lbs.
Carbon value of coal used ... ..	0·956	0·956	—
Total feed-water per lb. of coal ... ..	8·67 lbs.	8 69 lbs.	8 53 lbs.
Total feed-water per lb. of coal, from and at 212° ... ..	10 47 lbs.	10 50 lbs.	10 34 lbs.
Total feed-water per lb. of carbon value, from and at 212° ... ..	10 95 lbs.	10 98 lbs.	10 82 lbs.
Coal burnt per square ft. of grate surface per hour ... ..	13·5 lbs.	13·3 lbs.	25·6 lbs.
Feed-water per sq. ft. of heating surface per hour ... ..	3 39 lbs.	3 33 lbs.	6 34 lbs.
Feed-water per cubic ft. of boiler and boiler setting per hour ...	2 61 lbs.	2 57 lbs.	4 88 lbs.
Mean steam pressure above atmosphere, lbs. per sq. in. ... ..	158·6	159·6	144·3
Mean steam pressure absolute, lbs. per sq. in. ... ..	173·4	174·3	159·1
Mean temperature of feed-water, in deg. Fahr. ... ..	60·3	60·3	55 0
Mean temperature of air, in deg. Fahr. ... ..	67·4	67·6	62·3
Mean temperature of chimney gases, in deg. Fahr. ... ..	511·7	502·7	732·0

TABLE II.  
UTILISATION OF HEAT IN EACH POUND OF COAL.

	April 10.		April 11.		May 12.	
	Thermal Units.	Percent-ages.	Thermal Units.	Percent-ages.	Thermal Units.	Percent-ages.
Heat utilised in formation of steam ...	10,110	72·94	10,136	73·11	9,970	71·9
Heat lost by imperfect combustion (formation of carbonic oxide ... ..)	501	3·61	185	1·33	...	...
Heat lost by carbon left in ash ... ..	133	0·96	136	0·98	...	...
Heat carried away by waste gases ...	2,327	16·79	2,435	17·56	...	...
Heat lost by radiation and otherwise unaccounted for ... ..	789	5·70	968	7·02	...	...
Thermal value of coal as determined by experiment ... ..	13,860	100·00	13,860	100·00	13,860	100

We did not think it was necessary to have the coal chemically analysed, but its thermal value was determined by Mr. Wilson, and the results are given in Table III. It will be seen that the

TABLE III.

## THERMAL VALUE OF COAL.

Mr. Wilson reports that the sample of coal sent in contains 0.80 per cent. of moisture, and 6.74 per cent. of ash. He finds also that its thermal value is 13,860 units per pound if burnt in the usual way in a furnace.

Mr. Wilson also gives the following as an analysis of sample of ash and clinker taken on the trial of the 11th April:—

Moisture ... ..	0.33 per cent.
Ash (incombustible) ...	70.74
Loss on ignition (combustible)	28.93

100.00

coal which was described as "Powell Duffryn" had by no means a very high evaporative value, its carbon value being, in fact,

## EXPERIMENT OF APRIL 11.

Sample No.	Carbonic Acid.	Carbonic Oxide.	Oxygen.	Nitrogen.	Total.
Percentages by Volume					
7	8.96	0.00	10.43	80.1	100.000
8	9.29	1.44	8.98	80.29	100.000
9 & 10	9.55	0.00	9.84	80.61	100.000
11, 12 & 13	8.21	0.00	11.49	80.3	100.000

The average from these results is 8.85 per cent. of carbonic acid by volume, or 12.82 per cent. by weight, from which by calculation we find the air used per lb. of coal to have been approximately 23.3 lbs.

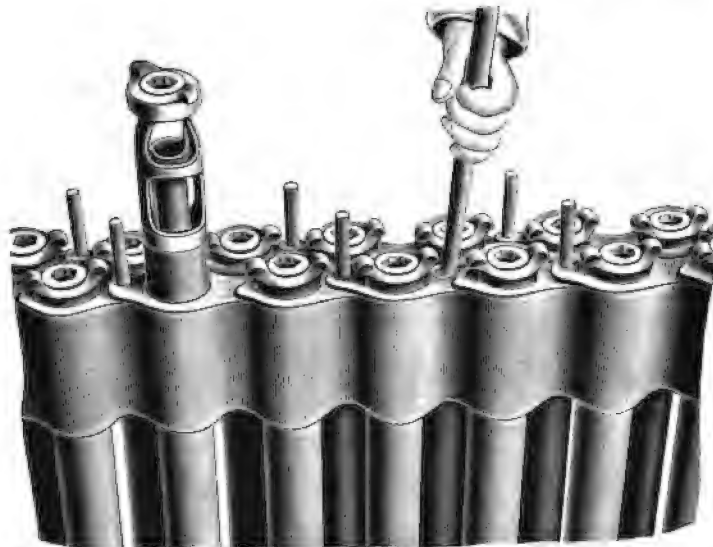


FIG. 7.

only 0.956. The ash shown by the analyses is somewhat unusually large for this quantity of coal. The table also gives an analysis of the ash and clinker brought home from the trials.

Table I. gives Mr. Wilson's analyses of the chimney gases collected on the two trial days.

Table V. gives the results of the determinations as to wetness of steam. It will be seen that in all cases, the amount of actual priming was so small as to be quite negligible.

On the 12th of May, we made a trial, as already mentioned, to see what output could be got from the boiler without injury and without priming, with a forced draught. The results of this trial are given in the same tables as those of the 10th and 11th of April, so far as they go. We measured the coal during this experiment simply as a matter of interest. The duration of the trial was of course too short to enable any accurate determination of the evaporative efficiency to be made. The figures in italics therefore must be taken as not more than approximative. On this trial, the duration of which was practically three hours, steam jets were used below the fire-grate, and the ash pit was closed. The jets induced an air pressure of 0.56 inches. The chimney was a very small one, capable only of giving a draught equivalent to 0.2 inches of water, so that the actual duty obtained from the boiler with the steam jets might have been equally well obtained without steam jets from any boiler provided with a chimney which could give a draught equivalent to 0.75 inches of water. The actual rate at which water was evaporated during this trial was 4,113 lbs. per hour, or 89 per cent. in excess of the normal rate, as represented by the former trials. It will be seen that the priming remained practically a negligible quantity, and there were no signs in the working of the boiler that it was being in any way unduly forced. The quantity of steam used by the jets

TABLE IV.  
ANALYSES OF FLUE GASES.  
EXPERIMENT OF APRIL 10.

Sample No.	Carbonic Acid.	Carbonic Oxide.	Oxygen.	Nitrogen.	Total.
Percentages by Volume.					
1	9.71	0.00	9.82	80.47	100.000
2	9.50	0.00	10.63	79.87	100.000
3	9.07	0.00	10.58	80.35	100.000
4	8.24	2.24	9.45	80.07	100.000
5	8.92	0.00	10.51	80.57	100.000
6	8.43	2.33	9.13	80.12	100.000

The last two samples were collected over brine by Mr. Low and were analysed to compare with the previous results obtained by him on the spot. In the calculations as to furnace gases made in the report, only the first four analyses, which were of samples collected over mercury, have been actually used. In these the average carbonic acid is 9.13 per cent. by volume, which is equivalent to 13.21 per cent. by weight. On working out, the air used per lb. of coal comes to 20.8 lbs.

TABLE V.  
PRIMING RESULTS.  
(a.) BY SALT TEST.

	Sample No.	Time.	Priming, per cent.
April 10 ... ..	1	A.M. 10.30	Not measurable.*
	2	11.38	0.35
	3	12.34 P.M.	Not measurable.
	4	1.51	" "
	5	3.40	" "
April 11 ... ..	1	A.M. 10.35	Not measurable.
	2	11.47 P.M.	0.43
	3	1.40	0.10
	4	3.42	Not measurable.
May 12 ... ..	1	A.M. 10.36	0.14
	2	11.40	0.04

\* The expression "not measurable" means that the priming was less than 0.03 per cent., which was the smallest quantity which could be measured.

MOISTURE IN STEAM BY WIREDRAWING CALORIMETER.  
TRIAL ON APRIL 10.

Time.	Pressure by Gauge on Boiler.	Temperatures.		Dryness Fraction of Steam.	Moisture in Steam per cent.
		Upper Ther- mometer.	Lower Ther- mometer.		
h. m. h. m. 10. 3 to 10. 5	161.6	357.0	279.3	.988	1.2
11.12 ,, 11.20	161.0	357.5	280.6	.989	1.1
12.17 ,, 12.21	160.8	359.6	282.8	.989	1.1
2.52 ,, 2.55	149.0	354.0	281.3	.990	1.0
				Mean	1.1

TRIAL ON APRIL 11.

h. m. h. m.	Pressure by Gauge on Boiler.	Upper Ther- mometer.	Lower Ther- mometer.	Dryness Fraction of Steam.	Moisture in Steam per cent.
10.14 to 10.20	160.5	360.25	281.75	.990	1.0
11.17 ,, 11.19	158.0	359.75	283.0	.989	1.1
12.14 ,, 12.18	160.0	361.0	284.0	.990	1.0
2.20 ,, 2.25	157.4	360.8	284.3	.990	1.0
3.16 ,,	158.3	360.3	284.5	.991	0.9
				Mean	1.0

The Salt test shows only boiler water projected into and carried by the steam. The Wiredrawing Calorimeter shows the total moisture in the steam.

was not separately measured, as the trial was intended to determine maximum output obtainable under conditions when special economy became of secondary importance.

In addition to the five tables appended to this report, we add copies of diagrams which show graphically the chief results of the trials.

(Signed), ALEX. B. W. KENNEDY,  
W. CAWTHORNE UNWIN.

### THE "LANCASTER" PATENT METALLIC PACKING.

MESSRS. LANCASTER & TONGE, of Pendleton, Manchester, are now sending out on approval (in the same way that they do their pistons and steam traps), the new form of metallic packing which we here-with illustrate.

A packing which the makers are prepared to fix free of expense and leave on trial for three months, removing them, and restoring the engines to their original state without charge, at the end of that period, if found unsatisfactory, must possess inherent good qualities to warrant them in making so unusual an offer.

Should any of our readers care to avail themselves of this offer they can have a set of the packing on approval on furnishing the following dimensions:— Diameter of rod, A, when turned. Diameter of gland studs, B. Length of ditto, C. Centres of ditto, D; and the inside diameter of stuffing-box, E.

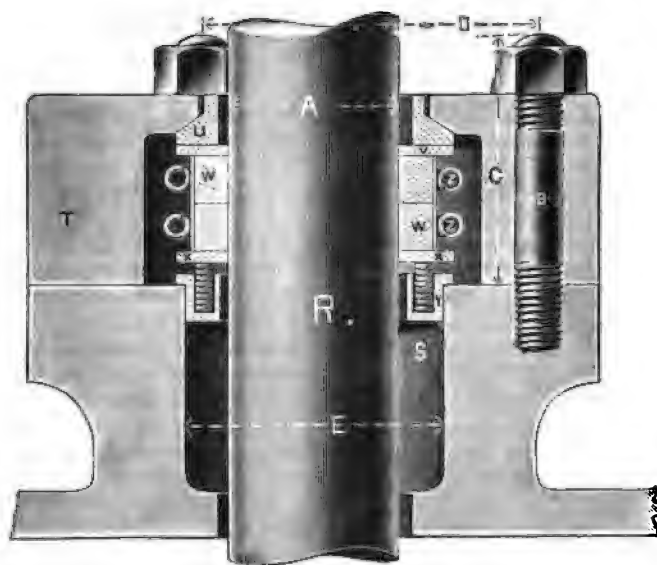
As will be seen, the construction of the packing is such as to ensure the blocks remaining steam tight, while freely giving way to any oscillation which may occur through the rod being out of truth in the cylinder, and this is attained in a simple, but at the same time perfectly efficient manner.

A reference to the illustration will show how this is accomplished. A coniform ring, U, has its coned-face ground to the correspondingly coned outlet of the outer casing T, thus forming, as it were, a steam-tight "ball and socket" joint. To fit the packing the piston rod R is, in the case of an old rod, first "skimmed," and the stuffing-box S, is cleared of old packing and collar bush. The outer casing T, is faced on to S, and bolted in place by the old gland studs, so forming a steamtight cavity, in which the packings freely work, the washer, V, being ground to U on one side, and to the packing W, on the other. Freedom is given for any possible variety of motion which may occur through the piston rod R being out of line with the cylinder. The washer X, is similarly ground, but on one face only, viz., that next to the packings, and is forced against the latter by the action of the springs in the spring bush Y, thus keeping the whole of the packing bearing against the front of the outer casing, and making each joint between steamtight.

The packings, W, are made of anti-friction metal, and are held to the rod by means of the two springs, ZZ, which, encircling the whole, give a perfectly equal pressure on each block. Besides ensuring an even pressure these springs effectually replace the number of small springs (difficult to manipulate and easily lost) to be found in the best existing forms of metallic packings hitherto made. When fitting care should be taken to pull the springs, Z, over the blocks, W, from the side nearest the cylinder, as the opposite end

has to make a steam-tight joint and should not be scratched.

These packings contain all the elements necessary to secure reliability and efficiency, and the fact of their yielding to any undue movement of the rod, thus setting up less friction, must ensure for them a longer life than can be expected from a rigid packing, while the even "clipping" of the blocks on the piston rod serves to keep it permanently true and smooth. We



cannot but think that those of our readers who avail themselves of the very liberal terms of free trial will ultimately become purchasers, and have every reason to congratulate themselves at having done so.

## THE NAVAL CONSTRUCTION AND ARMAMENTS CO., BARROW-IN-FURNESS.

### VISIT OF THE MANCHESTER ASSOCIATION OF ENGINEERS.

THE Manchester Association of Engineers devoted the first of their usual summer excursions to centres of engineering interest, to visiting the extensive works of the Naval Construction and Armaments Co., at Barrow-in-Furness, permission to inspect which had been very kindly granted by the directors. The party, which numbered upwards of a hundred, was conveyed by special train from Manchester, and reached the works at one o'clock, and every facility was afforded for a complete inspection of the marine engineering plant and all work in progress, the heads of the several departments being deputed to conduct the members all through the engineering shops and the shipbuilding yards. The inspection, which was full of interest throughout, occupied the whole of the remainder of the day, and commenced with a tour through the erecting and boiler shops, iron and brass foundries, and then on to the shipbuilding yard, where the chief portion of the time was occupied in going over several of the war vessels in hand for the Government. The most important work which the firm have on hand is the building of H.M.S. *Powerful*, a first-class cruiser, and sister ship to the *Terrible*, recently launched by Messrs. J. & G. Thomson, Clydebank. The engines for this vessel, which are well advanced, were seen in course of construction in the erecting shop, and consist of two sets of vertical triple-expansion engines, with four cranks, the special feature being the introduction of two low-pressure cylinders, the diameters of the cylinders being 45 in. high-pressure, 70 in.

intermediate, and 76 in. for the two low-pressure cylinders, the stroke of all the cylinders being 4 ft., and the I.H.P. of the engines is expected to be 25,000 without forced draught. The chief interest, however, perhaps centred in the Belleville water-tube type of boilers, which are to supply steam for these engines, and respecting which so much discussion has recently taken place in Parliament. There are to be forty-eight of these water-tube boilers, each having about 120 tubes, and the total length of these tubes, if placed end to end, would, it was estimated, be something like 9½ miles. Each boiler is to be independent, so that in case of accident to any one boiler it can be readily thrown out, and there would be no interruption of the continued supply of steam for the remaining forty-seven. The total heating surface of these boilers is about 68,000 square feet, with a bar surface in the grates of about 2,200 square feet; the working steam pressure in the boilers is to be 260 lbs. per square inch, which will be reduced to 210 lbs. per square inch at the engines. To convey smoke and products of combustion away from the furnaces there are to be four funnels having a total height of about 80 ft. above the fire-bars. The hull of the *Powerful*, which was going through the finishing preparations prior to launching on July 24th, was gone through from end to end and the various special points fully explained to the members. This vessel is 521 ft. 3 in. long on the water line, 71 ft. 6 in. beam, the displacement being over 14,000 tons at 27 ft. draft. She is to have no side armour, the protective element being in the armoured deck, which extends the whole length of the vessel with a maximum thickness of 4 in., tapering off to 3 in. at the ends, and the armament is to consist of 58 guns and 4 torpedo discharge tubes. Other Government vessels in hand were the *Juno* and *Doris*, second-class cruisers, which are practically duplicates of H.M.S. *Latona*, *Melampus* and *Neiad*, built by the company in 1899 and which have given great satisfaction. These vessels are 350 ft. long, by 54 ft. wide, having 5,618 tons displacement and a draft of 20 ft. The propelling machinery consists of two sets of inverted vertical, direct-acting triple-expansion engines, each set having three cylinders working on three cranks, the diameters of the cylinders being 33 in., 49 in. and 74 in., and the stroke 39 in. The steam is supplied by eight cylindrical multitubular boilers each having three corrugated furnaces; the total heating surface is about 16,000 square feet, and the working pressure 155 lbs. per square inch. The Barrow Co. have also in the dock the torpedo-destroyers, *Starfish*, *Sturgeon* and *Skate*. The *Sturgeon* had just passed through her trials on the Clyde most satisfactorily, her mean speed on the measured mile being 27.6 knots per hour. The *Starfish* and *Skate* were to go to the Clyde for trial in a few weeks. Each of these torpedo destroyers is fitted with two sets of triple-expansion engines, having cylinders 18 in., 27 in., 42 in. diameter by 18 in. stroke, and steam is supplied by four of Mr. Blechynden's patent water-tube boilers, the great advantage of which is the facility afforded for removing any tube without disturbing the neighbouring tubes. The working steam pressure is 200 lbs. per square inch. Another important and very interesting piece of marine engineering work in progress, portions of which, including the specially-designed sand-pumps, were seen in course of construction, in the engine-shops, was a sand-dredger for the Mersey Dock Board, which is to be practically a duplicate of the *Brancker*, built by the company in 1893, and which has proved very successful for the special purpose for which it was designed, the *Brancker* having removed from the Mersey bars as much as 180,000 tons of sand in one week, and largely contributed towards effecting the improvements which are now enabling the largest Atlantic liners to be berthed close to the landing-stage, thus saving the tedious process of conveying passengers and luggage to the vessels in mid-stream. The new sand dredger which the company are building is to be 320 ft. long, 46 ft. 10 in. wide, by 20 ft. 6 in. deep, having a displacement of 5,690 tons. There are to be eight hoppers, four on each side, extending 100 ft. in length, and separated from each other fore and aft by the suction pipe well. The capacity of the hoppers is 3,000 tons of sand, and with the *Brancker* this quantity was raised in less than forty minutes. The propelling machinery will be placed in the after part of the vessel, this consisting of two sets of direct-acting triple-expansion engines, the cylinders being 18 in., 29 in., and 47 in. diameter, by 30 in. stroke, and the valves are worked by double eccentric link motion, controlled by combined steam and hydraulic engines. In the engine-room two powerful centrifugal pumps are placed, to supply

circulating water to the main engines, and also the water required for discharging the sand from the hoppers. Two of Weir's patent feed pumps and an auxiliary duplex pump are also fitted. There will be three cylindrical multitubular boilers, 13 ft. 2 in. diameter by 10 ft. 10½ in. long, all constructed for a working pressure of 180 lbs. per square inch. Two sand pumps of the centrifugal type are placed in a room at the forward end of the vessel, each having suction and discharge pipes 36 in. diameter. Each pump is to be driven by an independent triple-expansion engine, with cylinders 11½ in., 18 in., and 29 in. diameter, by 18 in. stroke, and each engine is complete with its own condenser, circulating pump and air pump. The main suction pipe, 43 in. diameter, which is to be placed in the well at the centre of the vessel, will at the forward end branch to each pump, the cross connection forming a trunnion joint, which allows the pipe to be raised or lowered to dredge at various depths between 20 ft. and 53 ft. A ball and socket joint is also formed on the pipe at the forward end to allow some horizontal movement when the vessel is rolling or swinging. The sand and water will be discharged from the pumps into two landers running over the top of the hoppers, and the openings in the bottom of the landers are to be so arranged that the quantity of material going into each hopper may be regulated as required. The sand and water will fall into the hoppers, and the sand then will quickly deposit in the hopper, the water flowing over the side of the vessel. The sand-discharging arrangement is Mr. A. G. Lyster's patent. In the centre of each hopper is a large cylindrical valve, round the bottom end of which there are a number of holes, through which water is forced, as well as through the pipes round the walls of the hoppers. This water stirs up the sand on arrival at the discharging ground, and the valves are raised and the sand quickly discharged as soon as it is thoroughly saturated. The hopper valves and main suction tube are worked by hydraulic gear, and all the dredging operations will be controlled by a man in the lever house on the upper bridge. Amongst other work inspected was the twin-screw steamer, *Duke of Lancaster*, built to the order of the L. & Y. and L. & N. W. Railway Co.s for their Fleetwood and Belfast traffic, and which was in the hands of the painters prior to being placed on her station. The *Duke of Lancaster* is 310 ft. long, 37 ft. wide, and is propelled by two sets of triple-expansion engines having cylinders 24 in., 36 in., and 55 in. diameter by 33 in. stroke, and the boilers are two in number, 14 ft. 9 ins. diameter, by 20 ft. 8 in. long. The working pressure is 160 lbs. per square inch, and the speed of the vessel, under forced draught, is 19 knots per hour. We may add that the Naval Construction and Armaments Co. were also fitting four new boilers and a new low-pressure cylinder on board the paddle-steamer, *Manx Queen*. The members, after the close of the inspection, adjourned to the Imperial Hotel, where tea was served. Mr. Thomas Daniels, M.I.M.E., the ex-President, occupying the chair. Before separating, the Chairman, after reading letters of apology from the President, Sir E. Leader Williams, and from one of their ex-Presidents, Sir William Bailey, expressing regret at their inability to be present, said he was sure they had all been very much interested in what they had seen that day. Shipbuilding was perhaps somewhat out of the line of most of the members of that Association, but as Manchester had now become a seaport, it was very instructive to visit one of the most modernly-equipped shipyards in the kingdom and see the latest progress that had been made in shipbuilding. They had been very much indebted to the directors of the Naval Construction and Armaments Co. for the permission to inspect their extensive engineering establishments and shipyards, and the important work they had in progress. He had great pleasure in calling upon Mr. Buckley, of Oldham, to propose a vote of thanks to the chairman and directors of the company for their kindness in granting permission to the members to go through their works. Mr. Buckley said he had great pleasure in responding to the request of the chairman, and he was sure all the members would heartily join in seconding the vote of thanks which he had proposed. Mr. Webb, of Bury, in seconding the vote of thanks, said one thing which had attracted his attention was the excellent arrangement of the large engineering shops through which they had gone: there was plenty of light and plenty of room, and he had great pleasure in seconding the proposal. The vote of thanks having been passed with acclamation the proceedings terminated, and the party returned to Manchester by special train.

## RAILWAY SHIPS AT THE IMPERIAL INSTITUTE.

WE have recently had the pleasure of inspecting two very fine models exhibited by Messrs. William Simons & Co., of Renfrew, in the annexe to the Railway Exhibition at the Imperial Institute.

As the heading of our notice indicates, these are models of vessels intended to convey railway trains intact, so saving the loss of time and expense attendant on the loading and unloading of railway trucks, etc.

The first model represents a twin-screw steamer with an elevating deck for embarking and landing railway trains, vehicles, etc., on the quay level at any state of the tide. The vessel which this model represents, has a length of 320 ft., breadth, 54 ft.; and depth, 16 ft. 6 in., and has been specially designed for Channel service. Messrs. William Simons & Co. are the constructors and patentees, and a similar vessel, but smaller in size, can be seen at work on the Clyde at Glasgow. It is propelled by two sets of triple-expansion engines, imparting a speed of 16 knots per hour. The platform is supported by steel columns, the elevation being effected by means of screws working inside the steel columns, and is capable of carrying a locomotive and fourteen carriages of ordinary dimensions.

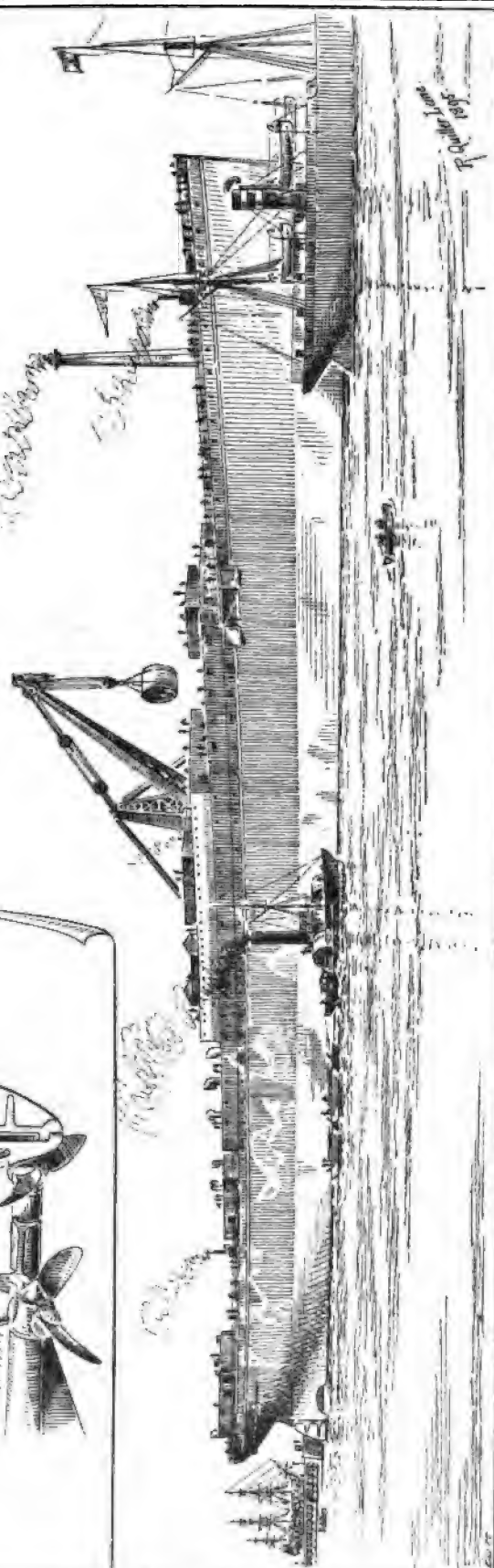
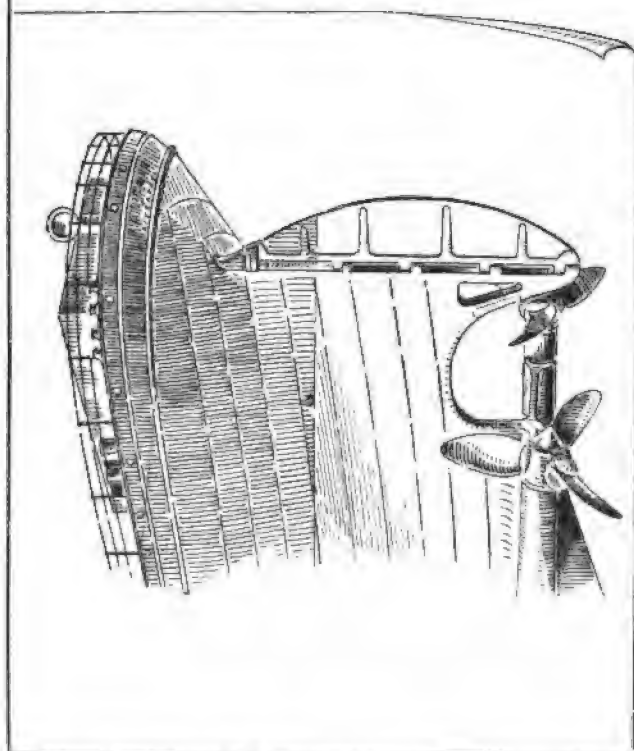
The second model we inspected is that of a twin-screw steamer having an elevating cross platform, designed for embarking and landing railway trains, etc., on the quay level, irrespective of the range of tide. The dimensions of this vessel are as follows:—Length, 250 ft.; breadth, 50 ft.; depth, 13 ft. 6 in. On the elevating deck are provided two turn-tables, by means of which the railway carriages (24 in number) are placed fore and aft on the vessel, and thereby placed on the main deck. In this case the engines are capable of driving the vessel at a speed of 12 knots per hour.

Those interested in the subject should not fail to see these models, which are typical of the latest steps taken in this new and most interesting branch of marine engineering.

## THE NEW WHITE STAR CARGO BOAT "GEORGIC."

WE give illustrations of this latest addition to the White Star Fleet. She is spoken of as the largest cargo steamer in the world. That she undoubtedly is. It is a question whether she is not entitled to claim to be the largest vessel of any sort afloat. Her dead-weight capacity is placed at 14,000 tons, and the weight of hull and machinery is sufficient to put her total displacement at several thousand tons more. She is certainly, therefore, larger than anything, except perhaps the *Lucania* and *Campania*. No warship yet contemplated approaches her displacement. She is fitted with twin screw and triple-expansion engines of the four-cylinder type as arranged in the new machinery for the single screw engines of the same line's *Germanic*, *Ionio* and *Coptic*. One of our illustrations shows the disposition of the *Georgic's* screws which is novel and peculiar. The arrangement introduced by Messrs. Harland & Wolff in the earlier twin-screw boats which they built for the White Star Line, and adopted by the Fairfield Shipbuilding Co. in the *Lucania* and *Campania*, is followed in so far as affects the carrying of the shafting as far aft as possible, inside the vessel's hull. The method of making one shaft longer than the other, and of allowing the blades of the two screws to work one behind the other, slightly overlapping in the hole in the deadwood, is also retained. But the heel-piece at the bottom of the hole in the deadwood is cut away altogether, and the base of the rudder is carried on a powerful bracket. The keel, too,

New White Star Liner "Georgic," Liverpool,  
at the 100 ton Crane, Belfast.  
Receiving her Boilers.





is cut away aft, sloping rapidly up from its normal level in the rest of the ship to the level of the screw shafting. By this means the play of the screws is given as much freedom as possible, and turning is greatly facilitated. The *Georgio* is the first vessel of the White Star Fleet to have this arrangement, but it was adopted successfully in the *Norman*, the recent addition to the Union Mail service also built by Messrs. Harland & Wolff.

The other illustration shows the *Georgio* lying under the sheers taking her boilers on board. The vastness of the ship appears from comparison of her bulk with a big marine boiler, as shown in the slings of the hundred-ton crane. Alongside her lies the Belfast Harbour Board's tug *Lion*, whilst at her stern is the training ship *Grampain*, formerly the two-decker *Gibraltar*, a ship of a very different class and period. It may be mentioned that the *Georgio* was first spoken of under the name of *Fordio*. The exact meaning of the latter word we do not know, and the change to *Georgio* seems to have been well advised. The vessel will resemble the other cattle ships of the line in appearance, having a single funnel and four pole-masts. She is advertised to leave Liverpool on her maiden trip on the 16th of August, which will involve great despatch in fitting her out, as she was only launched on the 22nd June.

We close this notice by giving a brief comparison of her leading dimensions with those of other important ships:—

	<i>Georgio.</i>	<i>Majestic.</i>	<i>Lucania.</i>	H.M.S. <i>Majestic.</i>
Length ..	557 ft. ..	565·8 ft. ..	601 ft. ..	390 ft.
Beam ..	60 ft. ..	57·8 ft. ..	65·2 ft. ..	75 ft.
Depth ..	40 ft. ..	39·3 ft. ..	37·8 ft. ..	—
Displacement } (tons)	— ..	16,740 ..	18,000 ..	14,900

## LIGHTS ON THE OCEAN.

SOME interesting and valuable information regarding the colour and visibility of the lights at sea has been published by the American naval hydrographic office as a result of special investigations undertaken by officers of this Government, Germany and the Netherlands. A marine observatory in Germany in this connection tested some 3,000 running lights actually in use on board ship, and found that two-thirds of them failed to meet conditions prescribed by the International maritime conference held in Washington in 1889.

It was then stipulated that the word "visible" should mean visible on a dark night with a clear atmosphere. The Germans have further pursued the inquiry by a systematic series of experiments. A light was set up on shore and observers embarked on board a steamer which ran over a well-buoyed course.

The point at which the light ceased to be visible was noted by each observer independently, as well as the point at which it first appeared on the return trip. The mean of the several observations was taken as the limit of visibility of the light under observation. The naval hydrographic office sends out the following:

The American experiments undertaken at Long Beach light station gave the following results in very clear weather: A light of 1-candle power was plainly visible at one nautical mile, and one of 3-candle power at two miles.

A 10-candle power light was visible with a binocular at four miles, one of 29 candles faintly at five, and one of 33 candles without difficulty at the same distance. On a second evening, exceptionally clear, a white light of 3·2-candle power could readily be distinguished at three, one of 5·6 at 4, and one of 17·2 at 5 miles.

The governmental experiments conducted at Amsterdam gave the following results: A light of 1-candle power was visible at one nautical mile, 3·5 at two, and 16 at five miles.

The German observations represent more varied conditions, and a large number of experiments with lights of widely differing character and intensity.

In experimenting with coloured lights it is only necessary to use the green, as it has been conclusively proved that if a light of that colour fulfils the required tests, a red one of the same intensity will more than do so. Comparisons of the observed and computed values of the visibilities of green lights disclose the fact that the calculated are smaller than the observed for short distances and greater for long ones: in other words, the green rays are subject to greater absorption by the atmosphere, even when perfectly clear, than rays of white light.

Hence it is that instead of being proportional to the square of root candle power, as in the case of white lights, the intensity of green lights is proportional to the cube root of the same, and the factor for multiplying this quantity is, as determined by German experiments, 0·80, the distance in miles at which a green light or a single candle power is just visible.

From this rule the candle power required for a green light to be visible at 1, 2, 3 and 4 nautical miles is 2, 15, 51, and 106 respectively. The experiments at Long Beach cited above, give for green light 3·2 candle power, fairly visible at one mile, and 28·5 clearly at two miles; these results, however, being from a limited number of experiments. The German trials were much more numerous.

The extraordinary rapid diminution of the visibility of the green light with the distance, even in good observing weather, and the still more rapid decrease in rainy weather of a character which will but slightly diminish the intensity of a white light, show that it is of the utmost importance to select for the glass a shade of colour which will interfere with the intensity of the light as little as possible.

The shade recommended is clear blue-green. Yellow-green and grass-green should not be employed, as they become indistinguishable from white at a very short distance. For the red a considerable wider range is allowable, but a coppery red is probably the best.

With regard to the loss which the light suffers in being transmitted by the glass, tests made show that this varies from 14 per cent. in the case of a perfectly clean glass to 51 per cent. in the case of one in the smoky condition due to a night's burning.

## IRON TRADES EMPLOYES ASSOCIATION

THE Report presented at the twenty-third Annual Meeting of the Iron Trades Employes' Association, held on Thursday, July 25th, at the Westminster Palace Hotel, London, referring to the present state of trade amongst engineers and shipbuilders throughout the country, states, that from the returns sent in to the secretary from the principal centres, it would appear that with a few exceptions trade generally is still bad, although there are some signs of slight improvement, which the committee earnestly hoped might be maintained. It would, however, be a long time before any benefit was likely to be felt from this, after such a long and acute depression. There was in some places slightly more activity, but prices had not improved to any extent, and competition each day grew keener. In a few engineering centres there had been some slight movement to force up wages, but in many cases without success. Very little had been done by employers to reduce wages, in fact there had not been much done in either direction lately. The men's societies continued to discourage overtime wherever they could, but very few organised movements had been made in this direction. Demands had been sent in to the employers in some places, but had not met with much encouragement. At Barrow-in-Furness an agreement was come to with the joiners in shipyards to abolish overtime as much as possible and limiting it on new vessels when it was necessary to work it, and in some other districts a standing agreement of limitation existed. It, however, had not spread much further. No further movement for the reduction of the hours of labour had taken place, and the committee hoped that their efforts to place the case before employers, workmen, and the public, both in the Press and by means of pamphlets, had done much to stem this off, but it was still necessary to bear in mind

that any marked revival in trade might very probably be the signal for a renewal of the attack. Piecework was still forbidden by the unions in many places, more especially in shops and districts where it had not heretofore been the practice, but there had been no great movement in this direction in the various engineering centres. There had been plenty of skilled labour to be obtained during the year; in fact, for every application for workmen the secretary had been inundated with replies, and he had been able to supply plenty of hands for the few firms requiring them. In conclusion, the report refers briefly as follows to some of the various questions in addition to those already mentioned, that had been raised by the men during the past twelve months. At Hull, the question of the demarcation of work between engineers and brass finishers had been raised, and in this respect a strike was still pending at Earle's Shipbuilding Co. At Glasgow arbitration had been agreed upon with regard to demarcation between engineers and boilermakers on work on Belleville boilers, and the arbiter had awarded work to boilermakers, viz., screwing tubes into boxes and subsequent testing of same and putting on doors. There had been a demand from the Machine Makers' Society at Hull for the employment of separate men on each tool on lathes; at Halifax it was demanded that each day should stand by itself for overtime, and at Liverpool, that machine minders should serve an apprenticeship, but these demands had been dropped. There had also been a short strike of boilermakers at Oldham with regard to a refusal to pay for bad workmanship, but this was settled in a few days in favour of the employers. There had, however, been no particular cause for the interference of the association, as most of the points had been dropped on a suggestion to make them general questions, the men's tactics appearing to be to attack firms individually on these subjects.

### MORGAN'S IMPROVED STEEL-WIRE BRUSH.

WE have pleasure in drawing the attention of our readers to the accompanying illustration of an improved hand-made steel-wire brush, manufactured from the best quality materials by Mr. Walter Morgan, of 33, South John Street, Liverpool.

This is just one of those useful little adjuncts to the engine-room tool chest that ought to find a place on



board every ship, for cutting, as it does, like a file, it will bring down the scale from boiler seams quicker than any other appliance for the purpose we have seen, while its utility for many other similar purposes will readily suggest itself to those interested.

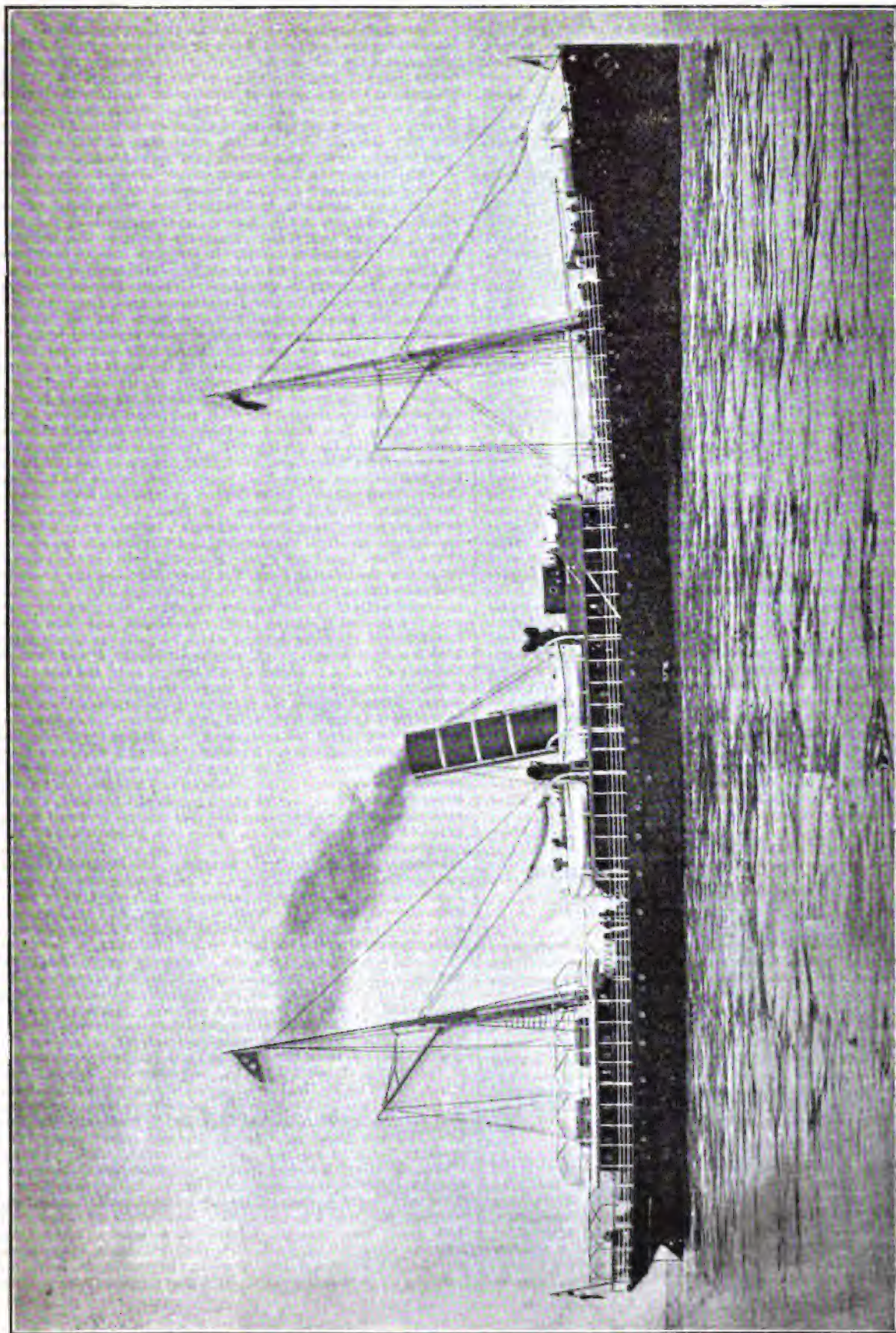
The brush is supplied at a moderate price, and can, we understand, be obtained from most ships' storekeepers.

### THE ROYAL MAIL STEAMER "VEGA."

ONE of the most interesting events that have taken place in connection with Wear shipbuilding during the present year is the completion and departure from the port of the above-named mail and passenger steamer. Though the vessel is not of great size, her dimensions being 233 ft. by 32 ft. by 22 ft. 4 in. moulded, the style in which she is fitted up is most elaborate, and great credit is due to the builders, Messrs. Joseph L. Thompson & Sons, Limited, North Sands Shipbuilding Yard, Sunderland. We give a page illustration in this number of the vessel, which is designed on very fine lines, is fore-and-aft

schooner rigged, and, with her couple of tall masts, her spacious bridge and promenade decks, her superstructure of white awning frame work, and her red funnel intersected at intervals with broad white bands, making a striking and attractive spectacle on the water. The vessel is to form an addition to the fleet of Det Bergenske Dampskibsselskab, which, in conjunction with another Norwegian company, has sailings three times weekly to and from the Tyne. The *Vega* has a deadweight carrying capacity of 800 tons, but in the summer season her cargo will chiefly consist of mails and passengers' baggage, for which special hold arrangements have been made to ensure, as far as possible, immunity from damage. Her engines, which have been constructed by Mr. John Dickinson, of the Palmer's Hill Works, Sunderland, are triple-expansion, and capable of giving an average speed of 14½ knots per hour. Steam is supplied by a large double-ended steel boiler, constructed to work at 175 lbs. pressure. The vessel has accommodation for 100 first-class, and a small number of second-class passengers. About one-third of the main deck aft is occupied with the tourist and dining saloons, the latter of which is entered from the former by two pairs of folding doors. The dining or main saloon is sumptuously upholstered in old gold silk plush. The tables—each of which is large enough to accommodate four persons—are of polished oak, and can be placed together or apart as desired. A number of oak swivel chairs with copper spring seats, are provided to supplement the seating accommodation provided in sofa form around the sides of the saloon. That part of the sides above the plush covered seating is ornamented with an extremely beautiful panel arrangement of polished Hungarian ash, with framework of dark oak and maple. A number of bevelled plate-glass mirrors are fixed in the woodwork and add greatly to the attractiveness of the apartment. The decoration of the roof consists of white enamel with ornamentation of gilding in lines and foliage, and it is supported by a number of fluted oak columns with Corinthian capitals painted in white and gold. A conspicuous object in the saloon is a beautiful oak sideboard, with top of black marble and electro-plated rails. A pretty arrangement of shelves at each end and a handsome clock in the centre completes this unique piece of furniture. The saloon is lighted by two teak-wood dome-shaped skylights with ornamental plate glass, which admit the light through a suitably placed well, in the music saloon above; and a number of brass side lights, fitted in the customary manner. It may here be stated that all state-rooms are lighted by brass side lights of a similar pattern. The lighting of the saloon at night is most effectively provided for by a novel combination of oil and electricity. This consists of nickel-plated pendants bearing each two 16-candle power lamps covered with coloured iced shades, and an oil lamp of large power; thus making three lights on each pendant, or 33 lights in all. This unique combination of oil and electrical lamps constitutes a splendid illuminating medium, and the effect when all are alight is brilliant in the extreme. The tourist saloon is furnished with a polished oak centre table, reaching almost from end to end; spring seated swivel polished oak chairs, and a handsome side-board at the forward end. The sides of the saloon are decorated with inlaid panelling of polished Hungarian ash, with framing of dark oak, and the ceiling is done in white enamel and gold, as in the main dining saloon. The lighting arrangements are perfect in every way, a number of three-light pendants with iced shades providing the electrical illuminating medium at night. On the after part of spar deck is situated the music saloon, which is furnished with a grand piano, with music stands at each side, and other necessary appurtenances. Forward of that apartment is the smoke-room, furnished with four marble-topped circular tables, cushioned seats, &c., and between these is the entrance hall to the main saloons, which are reached by wide stairs. These two saloons and entrance hall are lighted by windows of ornamental plate glass, and at night, by shaded electrical pendants. The state-rooms are on the main deck. For the accommodation of tourists a special dark-room is provided for developing photographic plates. All state-rooms, saloons, and other apartments are fitted with a simple but effective steam heating apparatus. The seamen, firemen and petty officers are comfortably berthed forward on the main deck, and on the lower deck forward suitable accommodation is provided for stewards, engineers, pilots, &c. The chief officers', chief engineer's and stewardesses' quarters are on the main





THE ROYAL MAIL STEAMER "VEGA."

deck. There is also on the main deck a spacious post office and separate mail room, and in this connection it may be stated that the vessel will carry a regular staff of post office officials to sort and arrange the mails while on the passage. Special attention has been given to the ventilation of all parts of the vessel, and the accessories for this purpose are very numerous, many being of new and improved designs. To assist ventilation, a number of large oblong brass lights, fitted on skid skylights, which can be opened when necessary, are placed along the engine and boiler-room casing, on the spar deck. There are four large boats (two fitted as lifeboats) with proper gear attached, conveniently berthed upon the bridge; the seats on all decks are portable, and can be utilised for life-saving, should occasion arise; there is an abundant supply of lifebelts, &c., on board; and as a further measure of precaution, four strong watertight doors are fitted at each end of the passage ways alongside engine and boiler casing on the main deck to be used in case of an emergency. Besides the boats already mentioned, the spacious bridge deck is occupied with captain's room, chart-house, patent compass of Sir William Thomson's design, engine-room telegraphs, a powerful steam steering gear and two large vegetable safes. The other deck furnishings consist of steam crane, windlass, two large steam winches for loading and unloading mails and baggage; screw steering gear, to be used in the event of accident to the steam steering gear; meat safe, lamp, oil, and store rooms; anchor crane, &c. The anchors are of the stockless type, and are stowed in the hawse pipes. The electric lighting installation is by Messrs. Harvie & Co., of Glasgow, and consists of 300 16-candle power lamps, and dynamo coupled direct to a Chandler's high-speed silent engine. It is carried out on the double-wired and distribution system, and has been completed in a thoroughly satisfactory manner. The lights in the saloons are suspended from handsome electro-plated pendants. Each pendant has a separate switch, so that the light can be turned on or off as desired. By each cargo hatch a cluster of 7 lights is placed, and along the passage ways on the main deck a sufficient number of lamps are fixed to give a very brilliant light when needed. These are also fitted alongside the houses on the spar deck. The same firm have fitted an equipment of electric bells, with indicator in the first-class pantry. There is a call bell on every bed board, so that direct communication between passengers and those in charge exists throughout the ship. The vessel was built to take the highest class under Lloyd's special survey, and was supervised while in course of construction by Mr. G. Lie, the company's superintendent, and by Mr. Wraamann, the engineer who will take charge, and also (during the period of fitting out) by Captain Eckhoff, who will take command. The Newcastle agents of the company named are Messrs. P. H. Matthiessen & Co., Queen Street, Quayside. The vessel, wherever she is seen, is bound to reflect credit on all who have had anything to do with her construction and equipment.

### THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

#### A Correction.

I FELL into a most unaccountable error last month, and one which I hasten to correct. In giving the name of the third officer of the *Teutonic*, the gentleman who performed the gallant deed in the Irish Channel for which the Queen has awarded him the Albert medal, I entirely misstated the name. The gentleman in question is Mr. C. W. Robinson, who is a sub-lieutenant in the Royal Naval Reserve, and like so many distinguished officers in the Mercantile Marine, an old Conway boy. Like so many of the old pupils of the Mersey training-ship too, he is a living example of the excellence of the physical training which the cadets enjoy there, and of the value of proficiency in swimming to the sailor.

#### The Improvements at Liverpool.

Liverpool is indeed going ahead. To begin with there is the acceleration of the special American Mail train on Saturday night and Sunday morning whereby another half-hour is saved on the mail transmission between London and Queenstown. By this means the Cunarder is dispatched soon after eight o'clock on the Sunday morning, instead of at about a quarter to nine, as was the case when the special was first put on. Further reductions in the mail transit will, of course, be made

when the new Irish Mail Service is inaugurated eighteen months hence.

Then there are the improvements at Liverpool itself. The Bar is long ago—as times move now—a memory. The tug or tender, and the cab across Liverpool are quickly following it to the limbo of forgotten trials to the passenger. I had the pleasure of being a guest of the London and North Western Railway Co. and of the Mersey Docks and Harbour Board, at the formal opening of the New Riverside Station on the 10th July. The London contingent of invited guests were brought down from Euston in a special train, consisting of two brake vans and five corridor coaches run *en suite*. Leaving Euston at 9 a.m., in company of such representatives of our hosts as Lord Stallbridge, the Chairman of the Railway, and Mr. A. G. Lyster, the engineer of the Dock Board, we ran easily and pleasantly down to the Riverside station at Liverpool in exactly the schedule time of four hours and twenty minutes. As far as Edge Hill Station there was not much of novelty to attract us. There, however, we ran in to the right of the usual platforms, and, after taking on board a few local guests, proceeded down the old Waterloo tunnel, which has had a good deal of work expended upon it to make it fit for its new duties of taking long and lofty saloon coaches and post-office vans instead of the short and low goods vans which have had the monopoly of its use for half a century. At the lower end of the tunnel we passed through the goods station, crossed the road, and found ourselves in the Dock Estate. Now, indeed we began to see what work had been done during the last six months. For we must not forget that it was only in December, 1894, that the plans for the Riverside Station were accepted. The train gets inside the pillars of the overhead railway, for it cannot use the old lines between the pillars. This is because the Board of Trade insists on passenger traffic being conducted with a certain margin beyond the extreme breadth of the coaches, and this margin the spacing of the pillars would not give. Thus, not only has the track to lie inside the existing lines, but there has been the necessity laid upon the engineers to set back and shave down the strong and solid walls of the dock sheds we skirt. On goes the train past the famous Waterloo grain warehouses, and soon comes to the first of the three bridges which its path has necessitated. This is a fixed bridge at the south-east corner of the Prince's half-tide dock. The object of this bridge, as of the last of the three, is to enable the train to pursue its course with an easy curve. Then it crosses the entrance to the Prince's Dock itself on a strong swing bridge, built on a concrete foundation, and actuated—as are all the bridges on the Mersey Dock Estate—by hydraulic machinery. Another corner of a dock has to be crossed by another fixed bridge, and then we are on the road between the west side of the Prince's Dock and the magnificent River Parade, which belongs to the people of Liverpool, who are so careless of their advantages that they seldom frequent it, and so into the Riverside Station. This is a handsome and permanent station, with three long platforms, all solidly built and thoroughly protected from the weather. The Riverside Station, even at first sight, strike one as a great improvement on the American line shed at Southampton. Though I have taken some time to describe the route, the journey was very quickly over, and five minutes after entering the Dock Estate we were being received on the platform by the Chairman of the Dock Trust and the Municipal officials. Immediately adjoining the station is the fine baggage-room, which has for some time been provided for the examination by the Customs House officers of the inward American passenger baggage. Here a luncheon for some two hundred and sixty gentlemen was served, and at its conclusion there were speeches from Mr. Brancker, the chairman of the Dock Board, from Lord Stallbridge, chairman of the North Western Railway, and from Mr. Ismay. The latter, whilst giving the Dock Board credit for what it had done to facilitate the passenger traffic, urged upon them the necessity of not considering that they had yet reached finality. The Prince's Landing Stage he thought would need all its space in the near future for the vast Channel traffic to North Wales, the Isle of Man and Ireland, which centres in Liverpool, and he believed that they would have to fill up the Victoria Dock and build a stage off its site which should be entirely reserved for the Atlantic trade. Meanwhile we were told that there was running behind us a special train from Euston with a hundred and twenty saloon passengers for the White Star Liner *Majestic*, advertised to leave the Landing Stage at four o'clock. At a quarter-past three in came



the express, the members of the Dock Board and its guests having adjourned to the station to see them arrive. The special, I may here remark, had made the journey from Euston to the Riverside in record time, beating ours by nine minutes. Her time was four hours and eleven minutes. Three minutes after her arrival the passengers were all on board. The *Majestic* lay with her head up river, stemming a swift ebb tide. There were 600 pieces of baggage to be detrained and shipped. These were carried down and put on board the *Majestic* in twenty-five minutes, and the steamer might have left a good quarter of an hour before her advertised time. She lay there, however, till four o'clock, giving us a good opportunity of admiring the graceful hull, which, as yet, stands as Messrs. Harland & Wolff's masterpiece. Punctually at four the *Magnetic* began towing, and the *Majestic*, aided with her own twin-screws, turned quietly outwards and round, and had started on her westward trip without any fuss or demonstration, almost before we had realised that the hour was up. At 4.30 the London guests rejoined the special that had brought them down, and started on their southward journey. We reached Euston as the clock struck nine, having enjoyed the hospitality of the North Western Railway in an excellently served dinner.

#### En Route.

The demonstration showed what a vast work had been done in a short time by Mr. A. G. Lyster, of the Dock Board, not only for the railway in construction, but also for the steamers, in dredging to allow the liners to use the stages at all states of the tides, and Liverpool may pride itself on having an engineer so capable of giving practical effect to her wishes. There is in contemplation for immediate execution a further work, viz., the extension of the landing stage towards the north, so as to give additional berthing space. This facility is urgently needed, for there have already been as many as three liners at once discharging or embarking passengers at the stage. A very complete installation of electric light is also about to be erected, so that the work of dealing with passengers and baggage can be done as easily in the hours of darkness as in daylight. There have long been provided here for the inward baggage "creepers" which take the packages, as unloaded from the steamer, direct to the baggage examination room, and so do the work of many human porters. It was remarked by some of the spectators on the 10th that similar appliances might be well afforded for the outward baggage. These gentlemen did not see that the circumstances of the two baggage streams are quite different. The inward baggage comes out of the ship and goes right away into the ample space of the baggage-room on the stage. The outward baggage goes on to the steamer, where space is limited, and where it has all to be stowed as it comes. If it came too fast the vessel's deck would be blocked. The porters can bring it down as fast as those on board can deal with it, and an outward baggage "crawler" would be no advantage. It is now evident that Liverpool will spare no trouble to retain her passenger trade and, equipped as she is, she should now be able to laugh at her rivals. Let her remember that these owe their existence to her apathy, and let her not again give them a chance of attempting to take her business away.

#### Publications.

Sir Donald Currie has been the originator of some novel and delightful customs. I would here instance only two. His colossal and princelike pinnies, where some of the most famous Englishmen of the age get the benefit of change and rest and sea air what time they travel to some interesting function. The other custom is that which provides us with literature of great artistic and antiquarian merit whenever a mail steamer is added to the list of the fleet of the Castle Line. We have recently seen instances of the observance of each of these customs. Of the first, when Mr. Gladstone and a large party of friends accompanied Sir Donald in the *Tantallon Castle* to the Kiel festivities, taking opportunity by the way to visit Copenhagen and the Danish Royal Family. Since then the *Tantallon Castle* has come home and resumed her staid employment of carrying mails and passengers to the Cape. But the vessel's owners have observed the other custom to which I alluded in her absence. They have produced a charming volume in her honour. Fortunately for readers, the *Tantallon Castle* bears a name of great historical interest, especially to those who are learned in Scottish history. We had some little inkling of this when a picture of the mouldering ruins of the old feudal fortress was included in that charming volume, the

"Cruise of the *Dunottar Castle*." Now we are treated to a book about the three *Tantallon Castles*. It would, perhaps, be hard to choose three buildings bearing the same name, which were more unlike, as we see them here portrayed. First in order of time by many centuries comes Marmion's stronghold, at the entrance to the Frith of Forth, whose aspect, as it still stands above the stormy waters, is so grandly portrayed by Mr. Joseph Pennell. Next in order of time comes the sailing-ship, built by the Curries for the trade round the Cape to Calcutta. She was an iron clipper, constructed just thirty years ago in the yard of the famous firm of R. Steele & Co., at Greenock. She distinguished herself by breaking the record to Calcutta. As a thing of beauty, she appears here in a spirited etching from the needle of Mr. W. L. Wyllie, advancing through the water under all plain sail. Last of all comes the present bearer of the name. As befits a modern ship of her type and class, she is shown by Mr. Wyllie as proceeding through the crowded river, and the whole representation suggests commercial success, if we cannot help realising that the beauty of the sailing ship is gone. The book, however, contains much of interest besides the history of these three. A good deal of space is naturally given, both in illustration and text to the internal arrangements and decoration of the commodore ship of the Castle Line. She well deserves the attention. But much is also given to the Cape voyage, and to the beauties of Madeira and South Africa. The get-up of the volume is excellent, and Messrs. Constable, the publishers, will have difficulty in breaking their own record next time they have to add a volume to the series.

#### New Tonnage

continues to be built by the big shipping companies, regardless of the fact that some of them do not seem to be making much out of what they already have. Those that are building are not, however, of the unsuccessful class. The *Tantallon Castle*, biggest and newest mail steamer of the Donald Currie Line to the Cape, is to be surpassed in each of these qualities by a new ship shortly to be laid down at the Fairfield yard, which produced those successful vessels the *Dunottar Castle* and the *Tantallon Castle*. Messrs. Wilson, of Hull, have ordered from the local firm of Messrs. Earle's a steamer of 7,000 tons, which will be at once the largest ever built or owned in the East Yorkshire port.

#### An Alleged Atlantic Race.

I have received a cutting from the *New York Mail and Express* of the 6th July. It is headed, "*Paris and Lucania* raced. The liners land their passengers after a lively voyage." The "liveliness" appears to be due to the alleged race which took place between the *Paris* and the *Lucania*. For it is said that "additional interest was lent the *Paris*'s trip by a hot run in mid-ocean for something like 300 miles with the big Cunarder, *Lucania*." It goes on, "The race occurred on Tuesday, 2nd July, and was a splendid test of the merits of the two ships in a light sea. Although the *Lucania* has twice the horse-power of the *Paris* she beat her to port by less than twelve hours." There is something a little suspicious about this paragraph, so I took the trouble to go into the hours of arrival and departure of the two ships. It appears that the *Paris* passed Hurst Castle outwards at 1.40 p.m. on the 29th June, and was telegraphed as passing Sandy Hook at 5 a.m. on the 6th July. The *Mail and Express* puts her passage down at 6 days 19 hours and 36 minutes, and that is about right for her run. The distance she steamed would be about 3,120 miles, and her speed as nearly as possible 19 knots. The *Lucania* left Queenstown at 8.45 a.m. on the 30th June and reached Sandy Hook at 5.19 p.m. on the 5th July. This would make her passage about 5 days 13 hours and 4 minutes. Her distance steamed was 2,865 miles. This would give a speed of 21.5 knots. Thus the mean speed of the *Lucania* was just 2½ knots better on this trip than that of the *Paris*.

It is true that the *Lucania* did not reach Sandy Hook more than twelve hours before the *Paris*, but it is not true that twelve hours was all the time she gained over the "*Paris*" on the trip, though the suggestion that it is so is deliberately made by the paragraph. To begin with, the *Paris*—though her departure is taken from Hurst Castle at 1.40—left her dock at noon, the time when the *Lucania*'s passengers were leaving Euston, and there is something in that. There is also something in the delay at Queenstown which enables the Cunard's mails (and passengers too if they wish it) to leave London after the close of business

on Saturdays. The fact, however, remains that the extra H.P. of the *Lucania* enabled her to do two and a half knots better than her rival, and that is quite as much as anyone would expect at these high speeds. But the "race" of which we are told—what about that? Three hundred miles would take the *Lucania* thirteen or fourteen hours to run. In that time she would beat the *Paris* by over thirty sea miles. As by the *New York Mail's* own showing the vessels were not in company till the Tuesday, the *Lucania* was busy for two days making up the start the *Paris* had got of her—a start which the paragraphist carefully ignored. And the last three days of the trip she was compiling the twelve hours by which she got in first. On the Tuesday, when the alleged race took place, she must have been moving to those on board the *Paris* from a position on the eastern horizon to another on the western horizon, and the race was more like the passage across the scene of an old-fashioned diorama. This is a sample of the misstatements on which the American public is fed, and these must be combated by those interested in the British Lines.

#### The "Berlin."

From the circumstances attending his end there was something peculiarly sad about the death of Mr. Lock, the second officer of the American Liner *Berlin*. The *Berlin* has for some time been worked exceptionally hard, running as she has so long been doing on the three-weekly round between New York and Southampton. She came in to the Hampshire port on the 6th July, and was not listed for sailing again till the 3rd August. Mr. Lock took occasion to be married during his stay on land, and started on his honeymoon to Devonshire. Suddenly taken ill in the train thither, he died in the presence of his bride. This sad event follows at no long interval the loss of the third officer of the same ship, who, as my readers were told at the time, was swept overboard during heavy weather in the Atlantic. Speaking of the *Berlin*, I may mention that the relatives of the only man who was lost from the Plymouth smack *Delight*, when she was run down by the *Berlin*, has just recovered substantial compensation from the International Co. The latter, in fact, did not dispute their liability, but left the assessment of the damages to a jury.

#### The P. & O. Company

have entered into a fresh agreement with the Italian Government for the service between Venice and Egypt with connections to the far East and South. The company had a line to Venice for twenty years. In 1892 the Italians tried to do without their assistance and terminated the contract. Three years' experience has shown that the trade of the port of Venice was not equal to continued existence without their aid, and so a new contract has been entered into. The service is to consist of a sailing each way every three weeks, Port Said being the Egyptian terminus. The P. & O. flag will now be seen in three of the principal ports of the Peninsula, the other two being Brindisi, whence their Indian and Australian mails are despatched, and where the homeward mails on these routes are entrained, and Naples, whence a service with Alexandria is maintained.

#### A Presentation

was made to Captain Angrove, the Marine Superintendent of the P. & O. Line, on the 16th inst., in commemoration of the jubilee of his connection with the historic company. The presentation was made by Captain Reeves, who was just about to start in command of the big liner *Australia*. What a change Captain Angrove has seen from the first vessel he was connected with in the fleet, a little 500-ton cockle shell, to the gigantic *Australia* and her sisters of equal size and speed.

#### La Compagnie Generale Transatlantique

has not yet done with minor misfortunes. The two accidents to *La Gasconne* were unpleasant, though they certainly proved that the company's ships were well found and well handled. The owners might have been content to leave these matters as evidence of that. But misfortunes never come singly, and *La Normandie*, on her westward trip in July, had an alarm of fire in the Atlantic. Smoke was discovered issuing from the forehold at half-past seven on the evening of the 9th, when the vessel was three days out. Though we may be sure that prompt measures were taken to subdue it, success was not attained till nine o'clock the following morning. The length of time the fire lasted is a sufficient proof of its extent. The further fact that it was at last

subdued, shows that the discipline and courage of the crew of *La Normandie* is quite equal to that of the *La Gasconne*, though the crew of the last-named seems to have got the lion's share of public credit. Let us hope that having completed a set of three accidents, any one of which might have been serious, the Fates will give the company a little respite from misadventure.

#### The "Australasian"

will be remembered by most readers as the vessel in which Mr. Froude, the historian, set sail for Australia, on the trip which gave us that charming book "Oceana." By all marine engineers she will be known as the first ocean steamer in which successful application of the triple-expansion engine was made. Though Dr. Kirk's invention is now universally adopted, the *Australasian* is only some 11 years old. Her success, and that of her sisters, have been so great that the owners, Messrs. Thompson, of Aberdeen, have just sent her back to her builders to have her passenger accommodation doubled. This meant, of course, removing everything and replacing it on a new and improved scale. The work was accomplished in three weeks, the vessel only leaving the Thames for Glasgow on the 21st June, and starting on her return from the Clyde on the 13th July. She resumed her work on the station on the 25th of the same month, having probably "broken the record" in this direction.

#### The "Elder."

When I last saw the *Elder* she was starting from Southampton for the Thames in tow of several tugs, and one imagined that the ill-fated steamer had gone from one's ken for ever. Dining the other evening at as unlikely a place as the Hampton Court Club, I was struck by the German character of the panelling and pillars of the room, whilst there also seemed to be a suspicion of the steamer about the work. Making enquiries thereon, I found that a very large quantity of the poor *Elder's* fittings had been bought by Mr. Tagg, of Hampton Court, and that much had been used to decorate the club. I was promised to see more next day. Accordingly I was shown a very handsome steam launch, the *Princess Beatrice*—whose name is already favourably known on the Thames by her predecessors in title—just ready to take the water. She is largely constructed of teak from the *Elder*. Under the shed where she has been built this vessel looked almost too large for up-river work. She is indeed quite capable of going to sea, for she has beautiful lines and is very strongly put together. Mr. Tagg, her builder, has made several curious innovations in her construction. He has tried to combine light draught and very complete immersion of the screw with large diameter of propeller. These seem irreconcilable. His method of meeting the difficulty has been to make the heel piece curve downwards so that the base of the rudder post is some 18 in. below the level of the keel. Thus room is given for the big propeller to clear. In the angle of the heel plate is fitted a strong metal disc, which it is intended shall wheel the deepest part of the vessel over any obstruction. She is certainly strongly enough built for it to be possible for her to stand an occasional strain arising from her partially ceasing, for an instant, to be entirely water borne. But it seems a little doubtful if the disc will revolve as the builder expects. The vessel has a large balanced rudder, and the clean run aft, and the absence of dead wood make promise of exceptional handiness. The steam launch, at all events as turned out from Tagg's Island, is likely to make a good fight against her newer rivals who rely for their power upon electricity and oil.

#### Steamers to be Sold.

There are several very important vessels on sale at the moment. The rapid progress of shipbuilding makes vessels now-a-days obsolete, or at least unsuitable for the trades for which they were built, long before they are worn out. Thus we see that the Pacific Steam Navigation Co. wish to dispose of their steamer *Sorata*. She is a vessel of some 4,034 tons, built in 1872 by John Elder & Co. She was at one time chartered to the Orient Line. At the same time the steam yacht *Cleopatra* is offered for sale. She, too, was an Orient liner, under the name of *Chimborazo*, before she came into her present service. It is not very long since she had a thorough refit in her accommodation. She was built in the same yard and for the same company as the *Sorata*, than which vessel she is slightly smaller and just a year older. Another Liverpool steamer announced for sale is the West India and Pacific Co.'s s.s.



*Bernard Hall*. She was built as recently as the year 1880 by James Laing, of Sunderland. Her name is that of the late chairman of the company which has so long owned her. Her departure from the list of the fleet will not deprive Liverpool of all memento of this gentleman, for he has a lasting memorial of himself in the Florence Institute, a club and gymnasium for poor boys, which he erected in the southern part of the city. The *Bernard Hall* is a vessel of some 2,700 tons, with compound engines, and is probably found too small and not sufficiently economical in working for the go-ahead board which now directs the line. Her departure is facilitated by the approaching completion of the two big twin-screw boats building at Queen's Island, and it will leave only one vessel of under 3,000 tons in the fleet, whilst there will be only four with compound engines. This is an example in the way of keeping the fleet up-to-date, which might very usefully be copied by some of the older and more famous Liverpool companies.

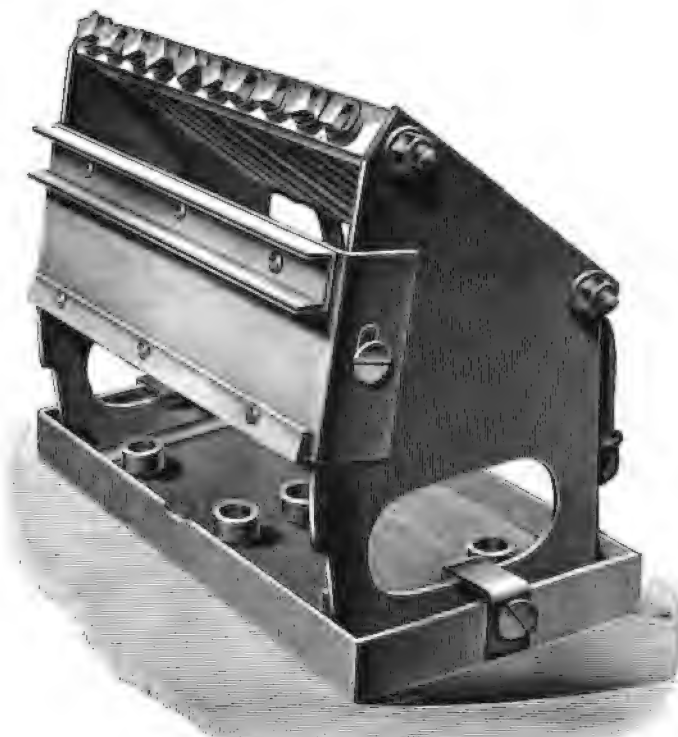
#### Marine Boilers.

The "Occasional Note" seems a necessary part of the evening paper. It is generally remarkable for its display of

boilers which, as far as it has yet appeared in the scientific Press, were restricted to small vessels built for naval purposes. It is news to me also to learn that the locomotive boiler at sea or on land has in regular work exceeded the 200 lb. pressure which is coming into common use in the cylindrical return tube type of boiler at sea for use with quadruple expansion engines. The high pressure and high speed is maintained by the ocean greyhound over distances measured by thousands of miles and over periods extending to more days than the locomotive engine steams hours. The writer surely does not think one locomotive runs through from London to Aberdeen. He will find that London to Crewe is the usual maximum run, and that that distance, 156 miles, without a stop, is the record. This was done in three hours. This is less than the four hours forced draught trial which is exacted even from naval machinery.

#### The "St. Louis."

There seems to be a great deal of doubt in certain persons' minds, as to what the *St. Louis* has already done, and as to whether she will be equal to the *Paris* and the *New York*, and



THE LEE-MANN SYSTEM OF "OIL-GAS" STOKING. FIG. 1.

bad taste and ignorance. For an example of the former see the remarks of the *Pall Mall* paragraphist concerning the visit of the Spanish Fleet to our shores. The Spaniards, however, probably, if they read them, appreciate the value of remarks from an American paper published in London. For ignorance in the paragraphist we must look to the *Globe*, whose "Naval Notes" are so full of knowledge and common sense. This journal had a paragraph on the railway "Race to Aberdeen," in which it contemplates the probability of disasters flowing from high-speed, and remarks: "We know, of course, that one source of difficulty with ocean greyhounds does not exist here. For some reason or other hitherto unexplained, the ordinary locomotive boiler of a railway engine will go on working at a very high speed without damage, whilst the locomotive boilers used for marine purposes are very quickly done for if put under high pressure." This is a wonderful statement, if a trifle obscure. One hardly knows which point in it to comment on first. It is news to learn that a boiler "works at a high speed," or, indeed, at any speed. I always thought the engine did the running. This, again, is the first I ever heard of an "ocean greyhound" having locomotive

what is required of her under her owners contract with the United States Government. We know now from express declarations from those interested, that she was never intended to rival the *Lucania* or the *Campania*, but was merely intended to earn her subsidy and to be a fair companion—perhaps a superior, as representing some seven years' ripper experience in steamship construction—to the British built twin-screw boats of the line. From my observation of her performances, I am inclined to believe that she will yet fulfil these expectations. She averaged, as has already been stated in this column, 18.87 knots on her maiden trip. On her second westward trip she made the passage in six days, eighteen hours, and forty-seven minutes, according to the official statement. The course steamed was given as 3,101 miles. This course, it may be mentioned, is capable of a reduction of at least an hour's steaming on the short autumn course. But taking the distance as it is, the speed works out at just 19 knots. The vessel has been driven on the quick round affected by the American Line ever since she came out, and there has therefore been no time for the little adjustments and improvements which the initial trips of all steamers (even of those turned out by firms with a large

experience in greyhound building) show to be advisable. We may therefore conclude that a mean sea speed of 19 knots by no means represents finality in the powers of the latest addition to the American Line.

### THE LEEMANN SYSTEM OF "OIL-GAS" STOKING.

**N**OW that even the water-carrying capacity of our boilers must be cut down to an alarmingly dangerous minimum in the insatiable craving for extra speed, a system which admits of instant control of the fires is of paramount importance.

In the Leemann system the turning of a single valve serves to extinguish instantly, and simultaneously, any number of fires.

*Each burner forms its own gas generator, hence there is never any oil (liquid or "spray") in the furnaces, the combustion is complete, the resultant being an intense blue, smokeless, flame, consequently there are no ashes and no sooting up of the heating surfaces.*

With this system all the advantages of forced draught may be obtained without having to provide



FIG. 2.

extra plant, as on emergency the consumption of oil may be forced to 20 per cent. above the normal capacity of the burners without decreasing their relative efficiency.

The accompanying illustrations, of which Fig. 1 is a front, and Fig. 2 a back view, are prepared from photographs of a burner that has been in use for several months at the shops of Messrs. Hathorn & Co., Drysdale Street Engineering Works, Shore-ditch, N., where exhaustive trials with this system have been carried out.

The following description of the *modus operandi* will perhaps best serve to show both the construction and working of the burner, it being understood that the oil to be burned is supplied from any suitable tank under a pressure (of air) of about 5 lbs. on the square inch.

From Fig. 2 it will be seen that the burner consists essentially of an inclined cast-iron "Vaporiser," provided at its upper and lower ends with a number of screw plugs for cleaning purposes. The construction is such that the oil entering the lower of the two elbows passes by the tube on the right hand side into the vaporiser, and after traversing a number of passages formed therein it reaches the tube on the left hand side connected by a couple of elbows to the nipple or burner proper. To light up, about a pint of free oil, or a lesser quantity of methylated spirit, is ignited in the shallow tray in which the burner stands. The burning of this, occupying about three minutes, sufficiently heats the vaporiser to admit of the main oil supply being turned on. This entering the heated vaporiser instantly passes into gas, and igniting at the nipple the flame passes along the underside of the vaporiser and out through the adjustable flame opening shown in Fig. 1. In the burner illustrated, measuring 12 in. by 6 in. by 10 in., over all, the flame opening is set at 9½ in. by 1½ in., and when burning ¼ a gallon of oil per hour a solid blue flame reaching 20 in. high issues from the opening. In this flame strips of No. 12 (S.G.) copper wire, 9 in. long, roughly the width of the flame, were melted in three seconds, the burner being in the open air.

In the trials carried out at Messrs. Hathorn's works, two burners of the size given above were placed in the fire-box, 3 ft. 6 in. by 3 ft. 3 in. by 2 ft. 9 in., of a loco-type boiler having 52 tubes, 2½ in. diameter by 7 ft. 3 in. long. Beyond the removal of the fire-bars no fitting or alteration whatever was made.

Starting all cold with 260 gallons of water, at 55 degs. Fah., in the boiler, 5 lbs. pressure of steam was raised in 65 minutes. (Under the same conditions, but with three burners in the fire-box, this was, on another occasion, accomplished in 47½ minutes.) As the result of a prolonged series of evaporative tests, it was found that 1 lb. of oil evaporated 18.4 lbs. of water at a steam pressure of 40 lbs., figures which proved the burners to have utilised 94.85 per cent. of the total heat obtainable from the oil. This boiler, carefully stoked with a fairly good steam coal, evaporated barely 6½ lbs. of water per 1 lb. of coal. This boiler gives roughly 7 sq. ft. of heating surface per cubic foot of water. Had the tests been made with a tubulous boiler giving 20 sq ft. of heating surface per cubic foot of water, the evaporation would have been much higher.

Throughout the four days' trials it was observed that in about 5 minutes from lighting up, the proper adjustment of the oil supply had been effected, after which the fire-doors were not again opened; that the flames were steady, almost noiseless, and odourless; that no smoke, or soot, was formed, the surfaces being as clean at the end of the trials as at the commencement.

It should be stated that in the boiler under notice the plane of the flame openings is 15 ins. below the

level of the old fire-bars: this gave 17 square feet more heating surface and ensured a better circulation of the "dead" water below the old fire-bar level.

As the result of several months use, Messrs. Hathorn find that they can dispense with two-thirds of their bunker space; that they have not had any ashes to remove; that the boiler space is much cooler; that a lad at half the wages has replaced the stoker (and could easily attend to two or three more boilers); and, finally, that oil per month costs £6 10s., against £8 15s. for coal.

Messrs. Hathorn & Co., of 10, New Broad Street, E.C., are acting as agents in England for the inventor, Mr. J. Leemann, of St. Gallen, Switzerland.

## NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondent.)

### The Naval Mobilization.

THIS year the mobilization of the Reserve Fleet is being carried out on a much smaller scale than has been customary for some time, if the sizes of the ships are taken into consideration, the largest vessels to hoist the pennant being two first-class cruisers. As regards numbers, however, there is no falling off, upwards of forty ships and torpedo boats being put into commission, which is rather above the average than otherwise. Indeed, there is no indication that the present Government will pay less attention to this important feature in the scheme of preparation for war than their predecessors. As usual, Chatham provides a large proportion of the vessels chosen from the Reserve. Here the two first-class cruisers *Grafton* and *Theseus*; the six second-class cruisers, *Charybdis*, *Forte*, *Tribune*, *Thetis*, *Andromache*, and *Apollo*; the first-class gunboat *Alarm*, the torpedo-boat destroyer *Dragon*, with three torpedo-boats, Nos. 72, 73, and 74, have hoisted the pennant. Portsmouth sends nearly as strong a contingent as this port, the six second-class cruisers, *Fox*, *Latona*, *Indefatigable*, *Iphigenia*, *Naiad*, and *Iris*; the five torpedo-boat destroyers, *Havock*, *Decoy*, *Boxer*, *Bruiser* and *Dasher*; and the five torpedo-boats, Nos. 79, 83, 84, 94, and 95, have been put in commission. From Devonport we have the four second-class cruisers, *Flora*, *Hermione*, *Astræa* and *Thames*; the third-class cruiser *Pearl*, the first-class gunboats *Hasard* and *Antelope*; the four torpedo-boat destroyers, *Rocket*, *Surly*, *Shark* and *Banshee*, with four torpedo-boats, Nos. 80, 85, 86, and 87. Of these vessels, the first-class cruiser *Grafton* appears in the manoeuvres for the first time, also the second-class cruisers *Fox*, *Flora*, *Hermione* and *Charybdis*; all the torpedo-boat destroyers, except the *Havock*, and the new torpedo-boats Nos. 94 and 95. Special interest will therefore attach to the performances of these craft.

### The Scheme of Evolutions.

As usual the authorities are taking advantage of this partial mobilization to carry out a series of manoeuvres, although these will not be of a strategical character, but more on the principle of the tactical exercises made in 1891. The Channel and Reserve squadrons have been largely increased and a torpedo-boat squadron formed for special work. The composition of these fleets is as follows:—CHANNEL FLEET:—Battleships: *Royal Sovereign* (flag), *Empress of India* (flag), *Resolution*, *Republique*, Cruisers: *Blenheim*, *Endymion*, *Grafton*, *Theseus*, *Charybdis*, *Forte*, *Latona*, *Indefatigable*, *Iphigenia*, *Andromache*, *Apollo*, *Pearl Bellona*. Gunboats: *Speedy*, *Halcyon*, *Jason*, *Niger*, *Sheldrake Alarm*. RESERVE FLEET:—Battleships: *Alexandra* (flag), *Bendow*, *Dreadnought*, *Edinburgh*, *Colossus*. Cruisers: *Wasp* (flag), *Galatea*, *Flora*, *Astræa*, *Thames*, *Mersey*, *Melampus*, *Naiad*, *Tribune*, *Thetis*, *Iris*. Gunboats: *Leda*, *Onyx*, *Renard*, *Salamander*, *Hasard*, and *Antelope*. The Channel Fleet which met at Portland, and the Reserve Fleet which assembled at Torbay, put to sea for a period of exercise which may be extended to the evening of Saturday, Aug. 3rd. During this period the exercises will include Fleet Evolutions, Cruising Formations and Battle Formations, Anchoring and Weighing, Scouting and Distant Signalling. After the cruise the two fleets will anchor on the west coast of

Ireland to coal, and will then perform some exercises in scouting, the concluding portion of the period of manoeuvring being taken up by target practice, the ships returning to their ports on Tuesday, Aug. 20th.

### The Torpedo Manœuvres.

The third fleet or flotilla which has been organised is to carry out a series of exercises on its own account in the Irish Sea, its object being to test the new torpedo-boat destroyers and to practice all the small craft in some novel tactics. This fleet consists of the second-class cruisers *Hermione* (flag) and *Fox*, four auxiliary craft as depot ships for the torpedo-boats, *Magnet*, *Curlew*, *Traveller*, and *Landrail*; the twelve torpedo-boat destroyers, *Daring*, *Havock*, *Decoy*, *Boxer*, *Bruiser*, *Dasher*, *Ferret*, *Dragon*, *Rocket*, *Shark*, *Surly*, and *Banshee*, and with twelve torpedo-boats No. 79, No. 83, No. 84, No. 94, No. 95, No. 80, No. 85, No. 86, No. 87, No. 72, No. 73, and No. 74. The Naval authorities have not made public the theme which is to govern the operations executed by this fleet, and they have taken special precautions to prevent the public or the Press being present or represented in any way during the operations. The ostensible reason for this is the ancient one that it is desired to keep the result of the exercises secret as regards foreigners. As it is well known that this is not the real reason, it is generally assumed that some doubt is felt as to whether the torpedo-boat destroyers will on actual service fulfil the promise of their trials. Whether it is wise to attempt to cover their experiments with a veil is a matter of opinion, but the authorities must be fully aware that by taking this course they lay themselves open to a great deal of hostile criticism, and that their motives will most assuredly be misjudged.

### Visit of Italian Fleet.

The programme of festivities in connection with the visit of the Italian fleet under the command of the Duke of Genoa to Portsmouth, was carried out without any mishap. The visitors also had the benefit, an uncommon one in this country, of continued fine weather during their stay at Spithead. The great battleships *Sardegna* and *Re Umberto* excited special interest, and to a less extent the older battleships *Andrea Doria*, and *Ruggiero di Lauria*, the cruisers *Stromboli* and *Etruria*; and the gunboats *Aretusa* and *Paitenope*. On the other hand the Italians had a capital opportunity for seeing Portsmouth Dockyard and the magnificent fleet of vessels it contains, including those building like the *Majestic* and *Prince George*, and the fine Reserve squadron of which several have since been mobilized and put to sea. Entertainments of all kinds were showered on the nation's guests, in the shape of banquets, balls, picnics, and garden parties, the bluejackets getting their share of these outward and visible signs of welcome, so that it is beyond question that one and all must have left these shores carrying away many pleasant memories. The principal event of the week's festivities was naturally the review of the combined squadrons at Spithead by H.R.H. the Prince of Wales, when advantage was taken of the opportunity to exhibit before a large body of spectators the performances of the new torpedo-boat destroyers. This exhibition was in every sense most impressive, and it is much to be hoped that these new fast vessels will be able to prove themselves equally good on active service as when merely parading under the most favourable conditions of weather at Spithead.

### Devonport Dockyard.

Two foreign squadrons in the Sound in one month is an almost unprecedented occurrence, but the three towns have proved themselves quite equal to it, and to a general election at the same time. The officers of both Austrian and Spanish ships were shown over the Devonport and Keyham establishments, and appeared to be much interested by everything that was shown them. We have had a succession of ships for repairs. The *Thunderer* was here, and then left for Pembroke. The *Wasp* also made a short stay, and then departed for the manoeuvres, after hoisting the flag of Admiral Pearson. She is to return to have a new set of tubes fitted to her condensers. The *Renard* also came in to have defects made good. Several vessels have made trials recently. The *Lynx* broke down on hers, a tube bursting, the circumstances of which have been the subject of a private inquiry. The *Halcyon* on trial made 15·3 knots, which is considered satisfactory. The *Sirius* has arrived from the south-east coast of America to pay off, and on her trial before hauling down the pennant she made 18·2 knots, which is very good indeed. In ships building and fitting, the *Arrogant* and *Furious*

are making good progress, and so also is the *Renown*. Some new plant has been delivered at the yard, and not before it was wanted. The machinery includes a bolt and nut-making machine, a horizontal drilling, boring, tapping and shedding machine, an electric light engine and dynamo, three powerful screw-cutting and self-acting lathes, a steam capstan, a horizontal boring machine, an hydraulic lift, and a punching and shearing machine. Altogether £20,000 are to be spent on new appliances here, the need for these machines having been long felt.

#### The Belleville Boilers.

The series of trials which have been made in the gunboat *Sharpshooter* with the new water-tube boilers, which are being fitted in the *Terrible* and *Powerful*, and will now be used in all our modern cruisers, have proved an indefeasible success. The excellence of these boilers is now unlikely to be called in question again, although there may still be those who will cavil at the Naval authorities for taking such a novel departure on what did at one time seem to be insufficient grounds. But the opposition to the introduction of these boilers has always partaken in some measure of a personal nature; there were those who had invested large sums of money in plant for manufacturing the old type of boilers, and it was natural that these should resist an innovation which appeared to threaten the industry to which they were tied and in which they had so large an interest. But after all, the efficiency of the Navy is a matter far and beyond any other, and there is no matter of doubt now that the water-tube boiler is exactly what the Navy has for long required. It was unfortunate, perhaps, that it was not originally tried in a vessel of larger dimensions than a gunboat, but even in these circumstances its value has been thoroughly demonstrated. During the trials a continuous speed of 15 knots was maintained for 65½ hours, when the thousand mile limit of the run stopped the test. This is all that could be wished, but there is every reason to believe that the whole series of trials will prove an equally qualified success.

#### Portsmouth Dockyard.

The chief event at this yard, speaking from a naval point of view, has been the visit of the Italian naval officers, who were shown all over the establishment and its stores of ships and material. The torpedo store seemed to excite a great deal of interest. Also the new docks, which, when completed, will take in the big cruisers *Terrible* and *Powerful*. The *Majestic* and *Prince George* revealed points of attraction. The former bids fair to be a record breaker, some 2,000 men being now employed upon her, the work going on night and day by shifts, so as to make her ready by December. The *Prince George* is also making steady progress, and will be launched on the 22nd inst. Her engines and boilers will be put into her some time in February next year. The *Cesar* does not make such good progress, but her hull is being put together in a dock, and when the work begins in earnest she should go ahead rapidly. The *Eclipse* cruiser, after a brilliant promise, has stopped dead almost. Her engines are being made in the yard, and will be ready for her as soon as she is ready for them. At present her wood sheathing is being put on. The *Pallas*, *Cordelia*, and *Sultan*, are in hand, and work will be quickened in these vessels during the manoeuvres no doubt. The royal yachts *Victoria* and *Albert*, *Alberta* and *Elfin*, and the cruiser *Narcissus* have also been under repair here, and some of these vessels have been completed for sea. The *Iris* was finished in time for the mobilisation and the *Pallas* will be out of hand in September. We had what at one time bid fair to be a serious fire here in the past month, but it was, fortunately, prevented from attaining large proportions. The cause of this and similar fires is the subject of much speculation in the yard.

#### New First-class Cruisers.

The designs for the new first-class cruisers which were promised in the First Lord's memorandum in the spring, but were not then ready, have now been published. They show a great difference in many respects from the *Blake* class, upon which they are said to be an improvement. Exclusive of machine guns the *Blake* carries twenty-six guns, the heaviest being 9 2-inch 22-ton breechloaders. The new cruisers are to carry nothing heavier than 6-inch quick-firers, and as might be supposed the whole armament will be quick-firing. The total number of guns carried by each vessel will be 41, comprising twelve 6-inch on the broadside in casemates, three 6-inch for right ahead fire, twelve 12-pounders for the ship, and two of the same calibre but

lighter pattern for boat and field service, and twelve 8-pounder Hotchkiss, and seven Maxim machine guns. Tubes for the discharge of 18-inch torpedoes will be fitted in three places, two submerged and one above water to fire right astern. The programme of shipbuilding for this year promised that four of these vessels were to be laid down and begun before March next. Of these four the *Andromeda* is to be built at the Pembroke Dockyard, and three others, the *Diadem*, *Europa*, and *Niobe* by contract in private yards. Up to this time the private firms have not been asked to tender for these ships, but it is now expected that the contracts will be signed this month. They will be fitted with Belleville boilers, and are to attain a high rate of speed.

#### Chatham Yard.

No date has yet been fixed for the launch of the *Minerva*, cruiser, at this yard, although she is nearly ready. Her shafting has been placed in position and the engines are in readiness to be placed on board. Only some wood sheathing needs to be finished. The *Magnificent* will be undocked for her steam trials this month, and it is quite anticipated that she will be the first of the ships of the Spencer programme to be completed. Her fittings for heavy guns are nearly ready, but there is some hitch about the turret mountings. On the *Victorious* 1,000 hands are at work, the armour belt is not yet on, but November will probably see her in the water. Her engines are being made in the yard, and are progressing rapidly. The *Illustrious* is also making fair progress and should certainly be ready for sea before the *Cesar*. Of other work, now that the mobilisation is over, we may expect to see a hastening which has not been very apparent lately. The refit of the *Immortalité*, however, is complete, and the *Audacious* has been taken in hand. From this yard the *Grafton* and *Thesus* were turned out as an escort to a flotilla of torpedo boats going to Gibraltar to be placed in reserve there. A number of torpedo boat destroyers are also in hand, and some are being sent to the yard from private builders every month. They do not employ many hands, but every little helps. The next ship for refit expected here is the *Sans Pareil*, which will probably be a rather large job. The promotion of Admiral Morant will lessen the period of his service here, and he will now go in September instead of November. He is highly popular, and much satisfaction was expressed when it was learnt that he was not to go at once. It is a matter of regret that he could not stay on.

#### H.M.S. "Powerful."

This fine cruiser was launched from the yard of the Barrow Shipbuilding Co. on July 24th, weighing just 500 tons more than her sister ship, which was launched from Clydebank on May 28th last. These magnificent cruisers are each 500 ft. long between perpendiculars, or 538 ft. over all, the beam being 71 ft., and the draught at the designed load line 27 ft. The space devoted to machinery and boilers in these vessels is 240 ft., a very large proportion, but essentially necessary when the speed to which these vessels are to be driven is considered. The amount of coal carried is also very large, for it is estimated that they will each be able to stow about 3,000 tons. The coal bunkers are so placed that to a great extent they will act as auxiliary protection against shell fire. The engines for the *Powerful* were designed by Mr. Blechynden, the manager of the Barrow yard, but the boilers, like those of the *Terrible*, are of the Belleville type. The I.H.P. at natural draught will be 25,000, and this, it is anticipated, will give a speed of 22 knots an hour. Both cruisers are to be ready for commission some time next year.

#### The Visit of a Spanish Fleet.

Among the more striking naval events of late years the frequent interchange of national courtesies called forth by the official visits of foreign fleets must assuredly find a place. The Columbus celebrations and the Kiel festivities were the cause of such visits on a large scale, but there have been many more which, if not of such general interest to the world, have at least their own importance in the eyes of our countrymen. To Portsmouth recently there have been French, Austrian, German, American, and Italian fleets, while Devonport has also been visited by Austrian and Spanish squadrons. The last-named of these has just left, after receiving a welcome which must have gone far to obliterate any memories aroused by the coincidence that the visit took place on the anniversary of the defeat of the Armada. The squadron consisted of the battleship *Pelayo*, a vessel which contains some features of particular interest to the naval profession; and two cruisers, the *Marques de Ensenada* and

the *Viscaya*, under command of Admiral Espinosa. As in the case of previous visits of foreign men-of-war, every effort was made to render the stay of the Spaniards enjoyable in every respect. The municipality of the three towns, as well as the naval and military authorities, worked together to render the programme of festivities complete, and it was carried out without a hitch of any sort.

#### Sheerness Yard.

The interest which has of course largely centred in the elections has now been transferred to the impending visit of the new Board of Admiralty. It is hoped that Mr. Goschen, who always took great interest in this yard, will do something to freshen up the establishment. When their Lordships come they will find that very fair progress has been made with the *Pelorus*, while the *Torch* and *Alert* have passed through their trials very satisfactorily. One guardship, the *Sans Pareil*, is about to leave here for Chatham to be refitted, and meantime the harbour will be without a big ship. The *Thesus* and *Grafton*, first-class cruisers, passed through here with a flotilla of torpedo-boats, Nos. 88, 89, 91, 92 and 93, which, with another they will pick up at Devonport, are going to Gibraltar. The *Wildfire*, yacht, has also been away to Portsmouth in connection with the visit of the Italian fleet, and the *Enchantress*, which had arrived here in connection with the proposed visit of the late Board of Admiralty, departed for the same purpose. The *Torch* will this month be transferred to the Medway fleet reserve, and the *Alert* will not be long in following her. The rest of the *Comus* and the *Egeria* is the only work of that description at present in hand.

#### Contract-Built Vessels.

All the reports of war shipbuilding for the British Government in private yards are very satisfactory, and tell of good progress made. Elsewhere we refer to the launch of the *Powerful*, and in the same yard at Barrow the second-class cruisers *Juno* and *Doris* are well advanced. It is anticipated that the *Juno* will be ready to take the water in September. At Laird's yard at Birkenhead the *Merr*, first-class battleship, is being constructed in dock, and her armour plating is now being fixed in position. She could be floated out at any time now. Messrs. Thomson's yard at Clydebank has been, until lately, almost a Government establishment in appearance, so many and so important were Her Majesty's ships being constructed there. At present the cruiser *Terrible* is being completed after launching, and should be ready to go round to Portsmouth early in the new year, and the battleship *Jupiter* will be ready to take the water in three or four months. There are also two second-class cruisers, the *Venus* and *Diana*, building by the Fairfield Co.; and two, the *Dido* and *Iris*, by the London and Glasgow Engineering and Shipbuilding Co., in the Clyde. These four vessels are similar to those under construction at Barrow, and all are well forward, and making good progress.

#### The Navy League.

That the country is in need of further education in regard to all matters concerning the Navy is a matter of common knowledge. Any kind of organisation which will take in hand this matter is therefore worthy of national support and sympathy; but self-constituted teachers must be well aware that their motives are always liable to misconstruction, and that their actions cannot fail to be subject to criticism. The Navy League is a body now of some six months standing, it describes itself as "a strictly non-political organisation, to urge upon Government and the Electorate the paramount importance of an adequate Navy as the best guarantee of peace." This is work everyone acknowledges to be required, and therefore at first sight it would appear that the League is deserving of general sympathy and assistance. It is able also to conjure with names which invite confidence. The late Admiral of the Fleet, Sir Geoffrey Hornby, was its president; it now claims Admiral Sir Vesey Hamilton as chairman of its executive council. It is when we begin to look into what it has done and what it is doing, that we find reason to control our feelings, and to withhold our support. The literature which the League is spreading broadcast is redolent of the faddist. It is well to teach the public the value to the country of an adequate and effective Navy, but for a body, self-elected, and without responsibility of any kind, to seek to control Naval administration, to lay down the law as to the numbers and nature of the ships we should possess, and to interfere in elections for the purpose of advertising itself, is altogether wrong. The Navy League has recently issued a journal in addition to its other leaflets. It is full of fair promises

which we trust may be fulfilled, but there are still wanting signs that the essential principles on which success alone can be insured, have been mastered by those who pull the strings. In time this may also come; meanwhile, we feel inclined to say, "Physician, heal thyself."

#### Pembroke Dockyard.

The work here shows no sign of slackness except that so far no commencement has been made with the first-class cruiser which was promised in May last. The *Hannibal* grows apace, and the *Renown* is being pushed forward with all possible expedition in view of her departure for Devonport in November next. Of repair work we have the boilers of the *Stormcock*, which is in its way a new departure. The *Thunderer* has arrived to take the place of the *Rupert*, only to depart again for the manœuvres, but now that these are in full swing and the Irish Sea is to be the scene of torpedo-boat evolutions, it will be strange if we do not find some additional employment. The *Thunderer*, by the way, was built here and launched from this yard on the 25th March, 1872. The training-ship *Northampton* has also been here and wanted a little done. The repairs to the caisson are now in hand, and thus the only dock at this yard is unavailable until they are finished. We have eleven building slips on which vessels can be rapidly put together, but there is great insufficiency of docking accommodation, and this would certainly be felt as a drawback in case of war. It is hoped that the new Government will carry out the promises of the last and make Pembroke an effective yard, not only for building but for fitting purposes.

### Miscellaneous.

**Tannate of Soda for Marine Boilers.**—We have pleasure in calling attention to the fact that Messrs. Ralph Rigby & Co., of the Providence Chemical Works, Walsall, have put upon the market a preparation of Tannate of Soda, intended specially for use in marine boilers. The merits of Tannate of Soda as a preventative of incrustation being now generally recognised, it is unnecessary to enlarge upon the subject here, further than to say that the Walsall firm, having given their close attention to the purpose of producing an article to meet the exceptional requirements of marine work, have achieved a very distinct success. This is shown by the fact that since the time of introducing this special preparation of Tannate—scarcely twelve months ago—the sale of the article has increased to an extent exceeding all anticipations. Messrs. Rigby & Co. are the largest manufacturers of this particular product in the United Kingdom. The firm are represented at most of the principal ports, where for the convenience of consumers, stocks are kept.

**Asbestos Goods.**—Messrs. Turner Bros., Rochdale, have again secured the Admiralty contract for asbestos goods for the year 1895–1896. They are almost continually receiving orders for this class of goods from the other Government departments, viz., the Home Office, the War Office, and Indian States Railways.

**Messrs. Lobnitz & Co., Renfrew,** are preparing to lay down a hopper dredger to carry 2,200 tons. The same builders also booked orders during the month to build a powerful barge-loading rock-dredger, and a steam tug of considerable dimensions.

**Messrs. Rankine & Blackmore, Eagle Foundry, Greenock,** secured an order, towards the end of the month, from Messrs. Morton & Williamson, naval architects, Glasgow, to build a powerful twin-screw steamer with overlapping propeller for trading and towing purposes in foreign waters. Messrs. Robert Dawson & Co. Limited, Port Glasgow, have sub-contracted to build the hull. The engines of the vessel will be supplied by the contractors, Messrs. Rankine & Blackmore, on their well-known disconnecting triple-expansion principle.

The French coast-defence armour-clad *Furieux* is undergoing alterations at Cherbourg. Her side armour is being lightened, which will enable her to carry a new armament of four protected quick-firers, and it is proposed that her two 18 in. guns shall be changed for others of new type.

**Change of Address.**—Messrs. The Defiance Anchor and Cable Company, Limited (late of Billiter Buildings, Billiter Street), have removed to larger premises at 95, Hatton Garden, London, E.C.



### NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from June 25th to July 26th, 1895:—

Bishop, Thomas H. B., engineer to the *Torpedo-boat* No. 91, to date July 9th.  
 Bolt, C. W., engineer to the *Snapper*, to date July 19th.  
 Brown, Thomas F., fleet engineer to the *Achilles*, to date June 24th.  
 Burnett, W. C., chief engineer to the *Zebra*, to date July 2nd.  
 Byrne, Albert D., assistant engineer to the *Victory*, for temporary service, to date July 2nd.  
 Colquhoun, P., fleet engineer, has been placed on the retired list, with permission to assume the rank of Inspector of machinery.  
 Dart, F. H., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.  
 Follett, S. G., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.  
 Foster, Edouard M., assistant engineer to the *Pembroke*, for temporary service, to date July 2nd.  
 Gaudin, Edward, engineer to the *President*, additional, to date July 2nd.  
 Jones, Griffith W., assistant engineer to the *Pembroke*, for temporary service, to date July 2nd.  
 Jury, Richard R., assistant engineer to the *Pembroke*, for temporary service, to date July 2nd.  
 Morris, T., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.  
 Meysey, John, fleet engineer to the *Australia*, to date July 18th.  
 Owen, John A., assistant engineer to the *Pembroke*, for temporary service, to date July 2nd.  
 Richards, Percy B., assistant engineer to the *Victory*, for temporary service, to date July 2nd.  
 Robins, Samuel J., fleet engineer to the *Penelope*, additional, to date July 10th.  
 Ross, G. J., staff engineer, has been advanced to the rank of fleet engineer to Her Majesty's fleet.  
 Sanderson, Philip A., assistant engineer to the *Pembroke*, for temporary service, to date July 2nd.  
 Screech, Jonathan J., assistant engineer to the *Victory*, for temporary service, to date July 2nd.  
 Shapcott, R. A., fleet engineer to the *Sirius*, on paying off.  
 Smith, Edgar C., assistant engineer to the *Andromache*, temporary, to date July 25th.  
 Weeks, George H., fleet engineer to the *Terror*, additional, to date July 10th.

### HOAR & BROWN'S HARDWOOD MARKET REPORT, JULY 24th, 1895.

TRK.	Timber Loads.	Planks Loads.	Blocks Loads.	Total Loads.
Stock, 1st July	5,079 ..	2,619 ..	46 ..	7,744
Landings	184 ..	265 ..	—	449
	5,263 ..	2,884 ..	46 ..	8,193
Deliveries	418 ..	213 ..	—	631
Stock, 19th July	4,845 ..	2,671 ..	46 ..	7,562

The deliveries so far compare very favourably with those of the two preceding years, but a large proportion having been sold for use in the dockyards, the balance only can be classed as ordinary trade consumption, such as that accounted for by the shipbuilding, rolling stock, and building industries.

There would appear to be a generally increased demand, and the prevailing low prices will favour the use of this wood still more freely in various quarters where it has lately been taken up. The present stock of logs is quite sufficient for requirements and the same remark applies to planks, in fact the market is quite full of every description.

**MAROGANY.**—Honduras, Tobasco, and Mexican. The stock consists of unusually poor consignments, and market prices are consequently low, with a slack demand. The offering of a Tecolutta cargo is likely to cause a further decline in values for a time.

There has been very little doing with Cuba, and the shippers, being unable to obtain offers for their landed stocks, have decided to withdraw their cargoes from the market for the present.

African and Panama have met lately with very little support, and it is quite an unusual thing to hear of prices in excess of 2d. or 2½d. per foot for sound wood unless the sizes are large, when perhaps 3d. may be reached for ordinary quality logs.

**CEDAR.**—There is nothing to report since our last, as arrivals have been very few. At the moment stocks of box quality are ample, and boat logs are scarce. The minimum quotation for the former stands at 2½d. per foot, and the latter commands any price up to 8d.

**KAWRIE PINE.**—At the public sale lately, values declined somewhat in consequence of the narrow specification of the wood offered, but prices remain about the same for ordinary average parcels. The minimum may be set at 2s. 2d., although a considerable quantity of oil-stained planks are offering at 1s. 8d.

**SEQUOIA.**—Some of the holders are becoming tired of inaction, and are looking round for a chance of clearing their large stocks; but up to the present very poor offers have been made, in fact, much below import valuations.

**GREENHEART.**—A very moderate trade is doing and prices rule at £8 for prime stocks.

**AMERICAN LUMBER.**—Ash is very little enquired for and prices rule low.

**OAK.**—There is a good demand for prime quartered wood of fair average widths, for which full values are readily obtained, while narrow widths are very slow of sale.

Moulding oak has been readily disposed of, though prices rule lower, and unless more discretion is used as to shipments, will further decline, the imports having been excessive.

**WALNUT AND WHITEWOOD** are in fair request, good grades being readily saleable at moderate rates, but culls are a drug on the market, and can only be disposed of at unremunerative prices.

**WHITEWOOD LOGS.**—Some bespoke shipments have been coming forward lately, but have been thrown upon the importers' hands, and it is possible low quotations will result.

Business is no better than it was during June, in fact, if there is any difference, it may be described as slightly worse.

### INDUSTRIAL AND TRADE NOTES.

#### THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

**SHIPBUILDING** is once more on the up grade, a change which may be attributed to a variety of causes. Ardent politicians on one side may think they find justification for tracing the improvement to the appointment of a strong Unionist Government, and will perhaps point out that since the beginning of the month there has been an almost unprecedented rush of new orders, the amount of tonnage placed on the Clyde alone in the course of the first half of the month being about double the quantity booked during the whole of June. On the other side it may be contended that the improvement in the industry is by no means of so recent a date: Lloyd's Shipbuilding returns, for the first six months of the year, clearly showing that there has been a steady increase in the tonnage under construction at all the principal centres. At the present moment the amount of tonnage "preparing"—ordered, that is to say, but not commenced, amounts to exactly five times more than it was three months ago. The expectation of orders for the new cruisers in connection with the Admiralty programme for 1895-96 being placed shortly may to some extent explain the "boom" of the last week or two, shipowners anticipating that the prices of material will stiffen when the new warships are added to the tonnage already on hand. Whatever the causes may be, the fact remains that additional tonnage is being ordered all over the country, and that Clyde artisans are reaping a benefit therefrom which has probably given an additional zest to their Fair holidays.

The marine engineering trade continues to show signs of great improvement. The number of unemployed has been considerably diminished, and the outlook is more reassuring than for the past eighteen months. The reports to headquarters, from the Clyde, and in fact from the whole of Scotland, show that trade has improved very much during the last month. There is a fair amount of work in the Clyde work-



shops at present, and the same remark applies to the North-east Coast marine shops.

The recently issued quarterly report of the engineer of the Clyde Trust, Mr. James Deas, affords additional evidence of the immense labour required to maintain the Clyde as a navigable channel. He details the work executed in Glasgow Harbour and at Cessnock Docks, and it is satisfactory to find that much has been done to maintain the harbour and its equipment in an efficient condition. Dredging operations continue on a gigantic scale, 535,637 cubic yards of material having been actually removed from the bed of the Clyde in three months. This labour, is however, absolutely necessary owing to the nature of the bed of the river. Were the dredging operations suspended the Clyde would speedily silt up, and as a navigable river become useless. It must be carried on unceasingly in order to allow the largest of vessels, on the one hand, to pass up and down the river in perfect safety, and on the other, to be launched from our shipbuilding yards. But for the depth of water, which is now assured by the dredging operations, it would have been in vain for our shipbuilders to accept contracts for great liners like the *Campania* and *Lucania*, or first-class battleships like the *Jupiter* and the *Terrible*.

It is fully expected that the contract for the four twin-screw steamers for the improved Holyhead and Kingstown mail service will be arranged shortly. These vessels must be ready early in 1897, and although this, under ordinary circumstances, gives plenty of time, every detailed plan is to be carefully examined on behalf of the Post Office, which means delay. The chief consideration in the new vessels will be speed, the time, including embarking and landing mails is, eastwards, 3 hours, 32 minutes, and westwards, 3 hours, 37 minutes. For every minute taken in excess of this a penalty of £1 14s. is to be exacted, and as the subsidy per trip is only £70, a delay of 41 minutes would entirely absorb the amount. It is anticipated that a fair share of the work will come to the Clyde.

An intimation has been received by the executive of the Boiler-makers' Society to the effect that on and after August 2nd the revised list of work governing the contract prices paid to boiler-makers on the Clyde will be enforced. The list has been revised by a committee appointed by the Masters' Association, and was submitted to the men about two months ago. The men, however, refused to accept it, as it was about 7½ per cent. below the prices paid at present. Not only so, but they contend that they are entitled to an advance in wages and demand a 10 per cent. increase on the present price list. Mr. Knight, the general secretary of the Boiler-makers' Society, intimated to all the branches that the men will be supported in resisting the reduction. Hopes are, however, entertained that the present hitch may be satisfactorily got over without recourse to serious measures on either side.

The meetings of the Institution of Mechanical Engineers to be held shortly in the Institute of Fine Arts, Glasgow, promise to be of particular interest, the secretary having arranged for several papers on highly interesting subjects. Mr. Deas will read a paper on a subject most familiar to him—the harbour and river; whilst, amongst others, Mr. Biggart, the manager of Sir William Arrol's works, will deal with hydraulic coal conveying and retort charging plant. Although final arrangements have not been made, it is expected that Mr. James Riley will read a paper, and that Mr. Walter Brock, of Dumbarton, and Professor Barr will be induced to contribute of their experience. The excursions promise considerable enjoyment. The members are expected to go with the *Glen Sannox* one day, and on another over the West Highland Railway to Ardlain, thence back over Loch Lomond. According to the programme now drafted out, the members will visit Milngavie to inspect the water works, to Dawaholme gas works, to the East End to see the sewage works; and amongst the works to be inspected are the Clydebank Yard of Messrs. Thomson's; Singer's Works, Clydebank; Wishaw Steel Works, Sir William Arrol's Dalmarnock Works, the Summerlee and Mossend Works, Messrs. Denny, Dumbarton, &c., while many other establishments are to be opened to the members, as are also the tunnel and subways of Glasgow.

The Fairfield Shipbuilding and Engineering Co., Limited, Govan, contracted early in the month with Sir Donald Currie & Co., to construct a steamer somewhat larger than the *Tantallon Castle*, built by them and launched last year for the same owners. The vessel will be 5,636 gross tons and is intended for service to the Cape. The *Pembroke Castle*, another of the Currie

liners, is, it is reported, coming round to Fairfield to receive a general overhaul.

Messrs. Charles Connell & Co., shipbuilders, Whiteinch, secured an order about mid-month to build a large steel screw steamer for a firm of owners in Liverpool. The vessel, which is intended for general cargo, will be 400 ft. long and will carry about 6,000 tons.

Messrs. A. Stephen & Son, Linthouse, are also reported to have secured an order about mid-month to build a steamer of large dimensions. It is pleasant to note that other important orders are known to be in the market.

Messrs. Mackie & Thomson, shipbuilders, Govan, received an order about mid-month from the Great Northern Steam Fishing Co., Hull, to build for them two new steam trawlers.

Messrs. J. & G. Thomson, Limited, Clydebank, contracted early in the month to build four other torpedo-boat destroyers for the Navy. These will be slightly longer than the *Rocket*, *Surly* and *Shark*, and are to attain 30 knots' speed both on the measured mile and over a three hours' continuous run. They are to be fitted with tubulous boilers, probably of the Normand type, as without them it would be absolutely impossible to get the power and speed while not exceeding the weight allowed for ship, engines and armament, 230 tons. Messrs. Thomson likewise booked an order during the month to build seven small steamers about 140 ft. long, and 200 to 300 tons displacement. This order was placed by the Spanish Government, who intend the vessels for use in connection with the Cuban rising. The same firm contracted with the Admiralty later in the month to supply and fit the machinery of the new third-class cruiser *Pelorus*, which has just been laid down on the building slip at Sheerness Dock Yard. The engines of the *Pelorus*, which is the first of the new type of third-class cruisers, are estimated to indicate 7,000 H.P. under natural draught, giving her a speed of 20 knots. If anticipations are realised in this respect the *Pelorus* will be the fastest third-class cruiser ever built for the Royal Navy.

Messrs. Ritchie, Graham & Milne, Craigton Works, Glasgow, it is understood have made arrangements to occupy the shipbuilding yard at Whiteinch, which originally belonged to Messrs. Lawrie & Co. This yard has been vacant for some considerable time, the last occupant being Messrs. W. B. Thompson & Co., of Dundee.

Messrs. William Simons & Co., shipbuilders, Renfrew, is being converted into a limited liability company, with a capital of £150,000. Messrs. Fleming & Ferguson, shipbuilders and engineers, Paisley, are also pursuing a similar course, the capital in their case also being £150,000.

Mr. Andrew Maclean, late of the Fairfield Shipbuilding Co., and Mr. Carmichael, lately manager with Messrs. Caird & Co., Greenock, are reported to be the parties who have acquired Messrs. Russell & Co.'s Greenock Yard.

Messrs. William Hamilton & Co., Port-Glasgow, received an order during the month to build two steamers of about 4,400 tons deadweight each. The hull and machinery of both these vessels are to be built to the requirements, and to take the highest class of the British Corporation for the Survey and Registry of Shipping.

Messrs. D. J. Dunlop & Co., shipbuilders and engineers, Port-Glasgow, booked an order early in the month to build three additional steel screw steamers to be employed for towing purposes in French waters. Each of these steamers will be supplied by the builders with compound surface-condensing engines. This order brings up the number of vessels contracted for by Messrs. Dunlop & Co. within a month, for the same owners, to six.

Messrs. A. McMillan & Sons, Dumbarton, booked an order early in the month to construct several of twenty 40-ton launches required by the Spanish Government. The balance of this order has been placed with an English firm—Messrs. R. Stephenson & Co., Newcastle-on-Tyne.

Messrs. The Ailsa Shipbuilding Co., Limited, Troon, received instructions from Mr. G. L. Watson, the well-known yacht designer, towards the end of the month, to build a small steam yacht, the engines of which will be supplied by Messrs. Muir & Houston, Kinning Park, Glasgow.

Mr. Robert Hill, of Greenock, disposed of, in the early part of the month, the four-masted iron ship *Euphrates*, 1,648 tons register, to Mr. Bowen, of Llangelly, for £6,550. This vessel was built by Messrs. Henry Murray & Co., Port-Glasgow, in 1879. Another vessel, the well-known iron ship *North*, which has been lying up amongst the idle shipping in the Gareloch

for a considerable period, has been sold to a firm of Italian ship-owners for £3,400.

## TRADE NOTES FROM THE TYNE, WEAR, TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

### THE TYNE.

**Shipbuilding.**—During the past month electoral matters have absorbed a large share of public attention, and possibly have to some extent—but, of course, temporarily—tended to restrict business. True it is at all events that very little has been done in the way of ordering new tonnage, and persons connected with the shipbuilding industry are forced to comfort themselves with the reflection that prospective investors in shipping are holding back their orders till the political atmosphere becomes more settled and the outlook, so far as regards commercial matters, can be more accurately gauged. The lapse of a few weeks will show whether the hopes of the optimists are likely to be fulfilled, and meanwhile we must content ourselves with taking account of the existing situation. The amount of work in progress at the Elswick yard of Sir W. G. Armstrong, Mitchell & Co. is now very large, consisting, as it does, of several cruisers, two torpedo destroyers, and a battleship. Frame material for another large cruiser is now being delivered, and the frame-turning department is, perhaps, busier than at any former period. The company have spared no expense in equipping the yard with the very best appliances to secure economical working, and they are reaping the reward of their enterprise by having—at a time when most other yards are slack—as much work as they can conveniently deal with. At the Low Walker shipyards business is now somewhat slack, but it is understood that at least one establishment—that of Messrs. Wm. Dobson & Co.—will soon show improvement.

Briarkness continues to exist at Messrs. C. S. Swan & Hunter's yard, and the same remark applies to Messrs. Hawthorn, Leslie & Co.'s yard, where there is work enough in hand to last well into next year. The ten large barges for Russia, which were ordered from Messrs. B. Stephenson & Co. in April last, have not only been completed, but have been despatched from their yard in sections for shipment. The firm have executed this contract with quite remarkable promptitude, and would probably have made a record for quick delivery, had it not been for an unforeseen delay in receiving material from the steel works. The firm have been commissioned by the Montrose Harbour Board to carry out extensive repairs—involving almost complete renewal—to the harbour dock gates, which are very massive and are constructed of iron. The firm are also completing three pairs of iron gates for the Barry Dock deep water entrance, which is 65 ft. wide, and 62 ft. deep. The gates are probably the largest that have ever been constructed.

The Palmer Co.'s Jarrow Yard has still a somewhat bare appearance, but it is understood that there is work in preparation which will soon cause the building berths to be tolerably well filled. It is confidently expected that this company will get some of the torpedo destroyers to build, which yet remain for distribution among private builders, to complete the programme of the late Government. This expectation is founded on the fact that the trials of the vessels of that type, which have already been built by the company, have given exceptionally good results, the speed attained having been considerably in excess of that guaranteed. The Tyne Shipbuilding Co. are understood to have a number of contracts to follow up those now in progress, and a continuance of briarkness in the yard is ensured for six or eight months to come. At Messrs. Readhead's yard work is still plentiful, one of the vessels in hand being intended for addition to a locally owned fleet of steamers. It is understood that a firm of ship-owners at Newcastle have lately placed an order with this firm for a steamer of over 5,000 tons carrying capacity. There are still three yards on the river that are absolutely idle, and as many more that are but a little way removed from that unsatisfactory condition.

**Engineering.**—At two of the marine engineering establishments between Newcastle and Shields, i.e., the St. Peter's Works and the Wallsend Slipway Works, business is very active, but at most of the other works, the orders in hand are inadequate for the full and continuous employment of the machinery. There

are at the Wallsend Slipway Works, in addition to other contracts of importance, three vessels belonging to the Russian Steam Navigation Co., being fitted with new machinery and boilers of the latest type. The engines for the largest of these vessels are constructed to develop a power equal to 2,000 H.P., while the engines for the other vessels will have an approximate capacity of 1,500 H.P. each. It may be added that Mr. W. F. Snowden, of the Side, Newcastle, has the contract for covering, with his well-known non-conducting composition, the boilers and steampipes on all three vessels. In the various departments of Messrs. Clarke, Chapman & Co.'s Works business continues active, and the output is kept up to a very satisfactory average. Messrs. John Abbott & Co. are fairly well off for orders, their iron founding and chainmaking departments being particularly well supplied. Mr. John Anderson, a local engineer, is introducing a speciality in connection with the working of steam engines, the purpose of which is to economize power to the greatest possible extent consistently with the maintenance of efficiency. Several engines have already been fitted with the speciality, and the results so far have been, it is said, exceedingly satisfactory. We hope to be able to give more definite particulars of this invention in a future number.

**Blyth.**—During the month of July there has been little or no ship repair work at this centre, and for a part of the time the whole of the graving docks were without occupants. No recent orders for new tonnage are reported, but the Blyth Shipbuilding Co. are at present putting down the keel blocks for a steamer of large size. The Union Shipbuilding Co. have in course of construction at their yard a wooden "trawler" or fishing vessel. There are at present a large number of men idle at this steadily-developing centre, but it is felt that the slackness relatively is no greater than at other ports on the North-East Coast, and a feeling exists that the port will be amongst the first to participate in any change for the better that may take place in the industrial situation.

**Electric Lighting.**—Among the electric lighting contracts at present being carried out by Messrs. J. H. Holmes & Co., of Portland Road, Newcastle, are the installations on three large steamers now building at the yard of Messrs. Hawthorn, Leslie & Co., Hebburn. One of these, the *Rhodon*, has three compound vertical engines, 6 in., 9½ in., by 6 in. stroke, coupled direct to three "Castle" dynamos (12 R.T.), each having an output capacity of 132 ampères at 100 volts, 250 revolutions. The total number of lamps in this installation is 350, and there are also fitted five motor fans, each capable of discharging 150,000 cubic feet of air per hour. The firm have also in hand installations of an important character on three vessels owned by the Russian Steam Navigation Co., which are now being re-engined in the Tyne. The names of these vessels are—the *Csar*, the *Konloff*, and the *Tumeloff*. The firm are also lighting three vessels building by the Fairfield Shipbuilding and Engineering Co., Glasgow, and have a number of other installations in hand. Among the special contracts recently completed are:—The steam yacht *Autis*, built for Mr. E. C. Fairley, Rio de Janeiro, by Messrs. Poole, Skinner & Williams, Dock Head Foundry, Falmouth, which has an installation of one 5½ in. by 5 in. open automatic engine, coupled to a No. 12 "Castle" dynamo, and 24 lamps, together with an electric pump. The fittings in the saloon are silver-plated, and of very handsome design. Another contract worth noting is the installation, on the steam yacht *Sybil*, built for Lord Lonsdale, by Messrs. S. White & Co., West Cowes, Isle of Wight. In this instance a 4 in. by 2 in. automatic engine is used, coupled to a No. 8 "Castle" dynamo, with an output of 25 ampères at 60 volts and 800 revolutions. There are 10 lamps supplied and a projector. There is also the steam yacht *Monsoon*, built by Messrs. Day, Summers & Co., of Southampton, for Lieut. W. N. Diggle, R.N. The installation in this case consists of a 5½ in. by 5 in. open automatic engine, coupled to a No. 10 "Castle" dynamo, giving an output of 35 ampères at 60 volts and 850 revolutions. There are 40 16-candle power lamps employed, besides accumulators. There has also been the lighting of three passenger steamers for the Isle of Man Steam Packet Co., namely the *King Orry*, the *Monagh's Isle*, and the *Snafell*. These are fitted with all the latest improvements in the way of such electrical appliances as dynamos, switchboards, &c. The engine in each case is an 8 in. by 8 in. open automatic, coupled to a No. 15 "Castle" dynamo, having an output of 180 ampères at 65 volts and 250 revolutions. There are on each vessel 210 lamps. The last recently completed contract to which we shall refer to on the present occasion is the

lighting of the s.s. *Australasian*, belonging to owners at Aberdeen. There is in this vessel 180 lamps supplied by a No. 12 "Castle" dynamo, having an output of 215 ampères at 60 volts and 250 revolutions. The engine is 8 in. by 8 in. open automatic, and is coupled direct.

#### THE WEAR.

**Shipbuilding.**—Messrs. Pickersgill have obtained from Messrs. Roberts & Co., of Liverpool, an order for a 5,000-ton cargo steamer, and it is understood that negotiations are in progress which are expected to result in the acquisition by the firm of another important order. Messrs. Robert Thompson & Sons, are framing a small vessel ordered for a special service and are receiving the centre keel plates for a vessel to be nearly 400 ft. long, and of proportionate dimensions in other respects. Rumour credits the firm with having an order for a cable ship; but this we are at present unable to confirm. As they have built several cable ships, however, which gave the fullest satisfaction to their owners, it is not at all unlikely that they may again be called upon to fulfil a need of this description, should one arise.

Mr. James Laing has put down in his West yard a large vessel on the speculative principle, and in the East yard the keel is being laid for a vessel ordered by local owners. Mr. Laing has a couple of good repair contracts on hand just now, namely, the overhauling of the steamships *Cotehele* and *Salisbury*. The first named is in the Deptford dock, and is having a large portion of the shell plating renewed, the other vessel being in the Cornhill dock, and having also part of shell and interior reconstructed. The new steamer *Myosotis*, built at the Deptford yard, has been sold to Italian owners, and has had its name changed to that of *Michel Angelo*.

At Messrs. Doxford's yard, and also at Messrs. Short Bros., business continues very active, and at the North Sands yard (Messrs. J. L. Thompson & Sons, Limited), preparations are being made for putting down two vessels of the largest class. Messrs. Blumer & Co. have launched two vessels which were being built to order, but they have still two unsold vessels on the stocks. At Messrs. Austin's yard, and Mr. Laing's, there are also unsold vessels on the stocks—one at each establishment.

**Engineering.**—There is little change to note in the condition of business at the marine engine works, the medium stage between activity and slackness being generally apparent. Some heavy castings have been delivered at the Palmer's Hill Works lately, which circumstance is, of course, indicative of some amount of prospective improvement. Among the manufacturers of steam winches and other deck accessories, Messrs. John Lynn & Co. are the busiest; but Mr. Rickaby, of the Bloomfield Engine Works, is kept well supplied with orders for piston rod packing and other specialities, and his establishment is accordingly kept in steady operation. A commencement of productive operations has been made at the Wreath Quay Engine Works, and it is expected that when the whole of the machinery is in position, a considerable development of business will take place. In the iron foundries there appears to be a little more doing, and the whole of the local forges have more or less work in hand. There is a prospect that the chainmaking industry may again be revived in Sunderland, and if so, it is possible that the manufacture of anchors may also be resumed. At present local shipbuilders and shipowners have to get their supplies of both chains and anchors from other centres.

**The Hartlepool.**—Since our last report referring to Messrs. Thos. Richardson & Sons, Hartlepool, the following vessels engine d by the firm have had successful trial trips:—On June 20th, the s.s. *Ockenfels* left the yard of the builders, Sir Raylton Dixon & Co., Middlesbro', for a full speed trial of her machinery in Tees Bay. The vessel, which has been built to the order of the Hansa Co., of Bremen, and is intended for their Eastern trade, has a deadweight carrying capacity of 5,500 tons, and is the fifth that has been built by Messrs. Dixon & Co., and engine d by Messrs. Richardson for the same owners. The engines, which are of the triple-expansion type, have cylinders 24½ in., 39 in., 67 in. by 45 in. stroke, and are fitted with many important accessories, including Geddes' pulsator water drainer, and a very efficient design of feed heater, the invention of Mr. D. Wulff, under whose superintendence the machinery has been constructed. Steam is supplied by two large single-ended boilers working at 180 lbs. pressure. On the occasion of the trial trip, an extended run was made off the Yorkshire coast, the engines being opened out to their full power, and during the whole of

the time the working of the machinery was most satisfactory, the trial proving in every sense a complete success.

On July 20th the s.s. *Michael Angelo*, built by James Lang, Esq., of Sunderland, for Messrs. Del'Orsa, of Genoa, had a loaded trial in Sunderland Bay, preparatory to proceeding on her voyage to the Mediterranean. The engines have cylinders—22½ in., 37 in., 61 in. by 39 in. stroke, and there are two large single ended boilers working at 160 lbs. pressure. They have been constructed under the personal superintendence of Mr. Robert Eccles, of Newcastle, and embody all the latest improvements designed for the attainment of the greatest economy in working.

At the shearlegs Messrs. Richardson are engaged in putting the engines on board the s.s. *Lady Furness*, a spar-decked steamer over 320 ft. in length, built by Messrs. Furness, Withy & Co. for London owners. The engines are triple-expansion, and have cylinders 24 in., 40 in., 66 in., by 45 in. stroke, steam being supplied by two single-ended boilers of large diameter.

Since our last report on the work turned out from the Central Marine Engine Works the following vessels have had their trial trips, which in each case have been very successful:—The *Romedalen*, a fine steamer built by Messrs. Wm. Gray & Co. for Messrs. Eriksen, Harland & Willis & Co., of West Hartlepool, and having engines 22 in., 35 in., 59 in., by 39 in. stroke. Steam is supplied by two large steel boilers working at 160 lbs. pressure. This is the third set of engines manufactured at the Central Works for this firm. The *Parklands*, a vessel built by Messrs. Wm. Gray & Co. for Messrs. Robt. Hardy & Co., of West Hartlepool, having engines 23 in., 36½ in., 63 in. by 39 in. stroke, and two large steel boilers with all modern improvements. The *Arion*, a fine type of cargo boat built by Messrs. Furness, Withy & Co. for Messrs. Rickinson, Son & Co., of West Hartlepool. This vessel has engines 23 in., 36½ in., 63 in. by 39 in. stroke, and two large steel boilers constructed for 160 lbs. pressure. This is the sixth set of engines built at the Central Works for Messrs. Rickinson. The *Elise*, built by Messrs. Wm. Gray & Co. for Messrs. C. Nielsen & Son, of West Hartlepool, having engines 19 in., 30½ in., 51 in. by 36 in. stroke, and two steel boilers to work at 160 lbs. pressure. The *Mathilda*, a large steamer built by Messrs. Gray & Co. for Messrs. J. Christenson & Co., of Bergen (being the fourth vessel built and engine d for this firm) having engines 24 in., 38 in., 64 in. by 42 in. stroke, and two large boilers. The *Majestic*, built by Messrs. Wm. Gray & Co. to the order of Messrs. W. H. Cookerline & Co., Hull, having engines 23 in., 36½ in., 63 in. by 39 in. stroke, and two large boilers. The *Middleton*, a handsome screw steamer built by Messrs. Wm. Gray & Co. to the order of Messrs. H. Sainman & Co., Hull, having engines 23 in., 36½ in., 63 in. by 39 in. stroke, and two steel boilers of large size, constructed for working at 160 lbs. pressure of steam. The shipbuilding outlook at this centre is promising, and business at the docks is just now pretty active, the season of timber importing being at its height. The local steel works are kept in steady operation, and rope works are fairly well employed.

**Stockton.**—At Messrs. Bopner & Co.'s Shipbuilding Yard business is still active, and it is understood that Messrs. Richardson & Duck have succeeded in obtaining work which will soon put their establishment in a state of comparative briskness. The engine works of Messrs. Blair & Co. continue to be well employed, but so much cannot be said for many other engineering establishments in the district, slackness being the prevailing feature. One or two boiler-making works keep actively employed, but bridge works are not as busy as could be wished.

**Middlesbro'.**—Sir Raylton Dixon's shipbuilding yard is still showing an appearance of activity, and it is understood that a very extensive repair contract has been obtained, which will make a large addition to the work in hand. The yard of Messrs. Harkess & Sons is becoming busier, as in addition to the repair work, which forms an important feature in the firm's operations, there are a couple of large barges on the stocks. The engineering Works of Messrs. Westgarth & English continue to show a fair state of activity, and in local steel works a little more animation is noticeable.

**Darlington.**—The works of the Darlington Forge Co. are still kept fully going, and there is every reason to expect that this satisfactory state of matters will be maintained throughout the remainder of the year.

## THE MERSEY.

(From our own Correspondent.)

THE usual monthly returns issued by the trades union societies bear evidence of the steady improvement that is going on in the engineering trades, the principal organisations again reporting a satisfactory decrease in the number of unemployed members who are on their books for donation benefit. The Amalgamated Society of Engineers has now less than 6 per cent. of its total membership on out-of-work support, and in the Manchester district, where the number of unemployed members has for a long time past been considerably above the average for other engineering centres, the returns now show only about 6 per cent. of the local membership on donation, so that the state of employment in this important district is now practically the same as in other parts of the country. The Steam Engine Makers' Society also reports a substantial reduction in the unemployed list, which is now under 3 per cent. of the membership, this being less than it has been for several years past. With regard to the state of trade in the various districts, heavy stationary engine-builders are mostly fairly off for orders, locomotive works report a slight improvement, machine tool-makers are better employed, and there is a continued slight improvement noticeable in marine centres.

With regard to the shipbuilding industry on the Mersey, a brighter outlook is reported and a fair amount of new business is in prospect, of which we may probably be able to give some particulars next month. During the past month Messrs. Laird Bros. have completed the passenger steamer, *Queen of the North*, intended for service between Blackpool, Llandudno, and the Isle of Man. We have already given a description of the general construction of this vessel, but a few further details respecting her machinery, in which Mr. Bevis has introduced quite a new departure in marine engineering, will be of interest. One problem which Mr. Bevis has had to solve, owing to the special condition of the service at Blackpool, has been to get 2,500 H.P. in a shallow boat with the least possible weight, and the least available space. This has been accomplished by combining inclined and oscillating engines, there being two diagonal high-pressure cylinders, 28½ in. diameter, and two low-pressure vertical oscillating cylinders, 50 in. diameter, the stroke of all the pistons being 5 ft. There are only two cranks, each of these being driven by one inclined and one oscillating cylinder. The intermediate shaft is cut in two and fitted with a coupling clutch, and when this is thrown out of gear, one paddle-wheel can go ahead and one astern. This coupling consists of a disc, in which there are a number of cylindrical holes keyed on the port crank shaft, and a similar disc into which are screwed an equal number of round steel pins, which slides on a fast feather in the starboard shaft. When the pins enter the holes both engines run together, but they can run quite as well without this coupling, which is only rendered necessary to prevent racing when the ship in rolling buries one wheel, lifting the other out of the water. Steam is supplied by two large locomotive boilers, closely resembling railway boilers in design. Each boiler has, however, two distinct fire-boxes, and the firing holes come down to the level of the grate bars to facilitate cleaning fires. The pressure, we may add, is 180 lbs. Another special feature in the *Queen of the North* is that the requisite draught is obtained by the aid of a large fan in the base of the funnel. The fan is about 4 ft. diameter, and is driven at a moderate velocity by a vertical single-cylinder engine in the port side of the sidley house, on the level of the main deck. The uptakes of the boilers open into the eye of the fan on the port and starboard, the fan shaft running athwartships. The shaft is cased in a tube several inches larger, which opens inside into the fan, so that a current of cold air is drawn continually between the tube and the shaft, thus keeping the shaft quite cool, so that no difficulty at all has been experienced with the bearings, and the draught produced is very good, being equal, at a moderate speed, to 1 in. of water in the ashpits. The stokehold is very cool, and there is a total absence of dirt and dust, which always accompany the closed stokehold system. The *Queen of the North* is already in her station at Blackpool, and is making regular and very excellent passages. In her trial trips she attained a speed of 18½ knots per hour, under conditions which were not at all favourable to high speed, and, notwithstanding this, she was fully a knot over the guaranteed running.

It may be added with regard to the *Salvador Correia*, a Portuguese gunboat built by Messrs. Laird, of which we have already given full description, that on being taken to Lisbon the vessel made a splendid passage, all things being considered, as it only occupied 8 days 21 hours 30 minutes in going from Liverpool to Lisbon. The three full days she was at sea were very heavy, a cross sea with a big swell being on, and the ship rolling and pitching very much; but in spite of this the vessel did 272, 251, and 260 knots respectively, the daily coal consumption being only 7½ tons. The total distance run was 1,047 miles, and the total consumption exactly 32 tons. The average speed per hour was 11·2 knots, and with average revolutions 180·6 per minute the average coal consumption per mile was 60·4 lbs., and the average consumption per H.P. per knot was only 1·4 lbs. These results speak well both for the manner in which the ship was handled on her voyage and for the good workmanship displayed by her builders.

Messrs. James Stott & Co., Vernon Works, Oldham, have brought out an improved form of air-propeller, which possesses a number of special advantages for use in the mechanical ventilation of engineering works and vessels. In this propeller the principal feature is the large amount of displacement power as compared with the small amount of energy expended, and another advantage is the full and uninterrupted feed combined with quick discharge. The air leaves the discharge surface at near right angles as is practicable, so that much valuable energy is conserved. In ordinary propellers a small amount of back pressure diminishes very seriously the output obtained, but the arrangement of the "Stott" propeller blades is such that they will overcome any reasonable amount of resistance by the pressure they exert on the moving air, this slight pressure given to the air also admitting of heavier work being done, a small size "Stott" propeller being sufficient where a larger fan of another type would be needed, and the propeller has also the additional advantage of running equally well in a vertical, horizontal, or angular position. The "Stott" air-propeller is specially adaptable for use in conjunction with the firm's patent air-washer or screen, in the ventilation of works, boiler-houses, electric lighting stations, and other establishments, as well as for humidifying and disinfecting purposes. In the "Stott" air screen the surface undergoes repeated cleansing by immersion in the water contained in its trough, and the screen, which performs a continuous revolution, can never become fouled by contact with accumulations of impure matter left by air previously screened, which is the case with non-revolving washers. The surface is also always taut, so that no particles can pass, and the temperature in winter is always kept above 32 degrees Fahr., thus avoiding freezing of the pores, which would impede and prevent the free percolation of the air. The flowing air can be saturated with a germ-destroying medium, so that the screen is specially suitable for hospitals, and the washer is also applicable as a humidifier. We may add that the firm can also adapt the above appliances to the ventilation of steamships, for which they have designed special arrangements.

Messrs. Holden & Brooke, St. Simon's Works, Salford, Manchester, have recently designed a number of new designs in "self-acting" injectors, the chief feature of which is that the back pressure valves can be readily examined and repaired while the boiler is under pressure. The sticking of back pressure valves, especially in the case of small injectors, is a source of constant trouble and danger, but in the new injectors introduced by Messrs. Holden & Brooke, this cannot occur, as it is only a question of a few minutes, to remove the valve cap, and put the valve in order, should it be blocked or stuck. One special design, the "V" pattern, is applicable to vertical boilers, and is being largely used for steam crane, deck and donkey boilers, and others of that class. The injector has self-contained fittings, including a regulating cock, and back-pressure valve, and a stop valve if desired between the injector and the boiler, together with a steam valve and suction pipe. The nozzles may be withdrawn and the back-pressure valve cleaned and repaired, while the boiler is under steam. The injector starts working without any manipulation beyond turning on the steam and water cocks, and may be placed either above or below the water supply. The action of the injectors is perfectly automatic and if interrupted as by the accidental admission of air in the feed water, they will instantly re-start without any attention. They will also take hotter water and are less "nice" in their action than ordinary injectors. The firm also make an injector specially adaptable to traction and portable boilers, this design being

called the "AV" pattern. In this injector, the delivery flange is attached to the boiler at any point required. The stop-cock, back-pressure valve, and water cock are all self-contained with the injector, the cap of the back-pressure valve being removable under steam for cleaning purposes. A regulating cock is fitted to the injectors so that they can be adjusted to suit variations in the steam pressure. If the action of the injector is interrupted by jolting or by blows from the road, it re-starts instantaneously, without attention, and with steam full on, whereas ordinary injectors would require to be shut off and stopped before a fresh start could be made, whilst another advantage of the "AV" injectors is that they are unaffected by the "swagging" of the water in the tanks.

In the iron trade a moderate weight of business has been coming forward, and for pig-iron prices have shown a substantial advance on last month's rates. Makers are now apparently desirous to avoid filling up their books for any time forward, as it is anticipated that as the year advances prices will move steadily upwards. Local pig-iron makers, although doing only a limited business, are firm in their prices, and now quote 43s. less 2½ for No. 3 foundry, delivered Manchester. In district brands the minimum quotations for Lancashire are now fully 1s. higher than they were last month, forge being quoted 38s. 6d. and foundry 40s. net cash, with Derbyshire foundry remaining at about 43s. 6d. up to 45s. net cash delivered in this district; there is only a slow business doing, but makers are indifferent about booking further orders just at present. In outside brands no great weight of business has been put through, but prices have shown a hardening tendency, good foundry Middlesbrough averaging 44s. 10d. net cash delivered Manchester, and Eglinton being now quoted to 46s. to 48s. 6d. delivered Lancashire ports and 48s. to 48s. 6d. net prompt cash delivered Dock Quays, Manchester; these figures do not represent prices obtained on much actual business, but sellers are indifferent about booking orders, and in some cases will not take less.

In the finished-iron trade a general improvement is reported, and forges are now, as a rule, on about full time. Prices are firm at £5 2s. 6d. for Lancashire, and £5 2s. 6d. to £5 5s. for North Staffordshire bars, £6 17s. 6d. to £7 for sheets, and £5 15s. for random to £6 for special cut lengths of hoops delivered Manchester district, and 2s. 6d. less for shipment.

In the steel trade business during the month has been coming forward but slowly; with the close, however, a more hopeful tone prevails, and prices in some directions are stronger. Hematites remain at about 52s. to 52s. 6d. less 2½, and steel billets £4 to £4 6s. net cash. In steel boiler plates there is rather more doing, with prices firm at £6 to £6 2s. 6d. delivered in this district.

In the metal market only a slow business is reported, but list rates for manufactured goods are advanced. Delivered Manchester district they remain as under:—Solid drawn brass boiler tubes, 6d.; solid drawn brass surface condenser tubes, 7½d.; solid drawn copper tubes, 7½d.; brazed copper gas and steam tubes, 7d.; brazed brass gas tubes, 6½d.; brass wire, 5½d.; copper wire, 6½d.; rolled brass, 5½d.; sheet brass, 7d.; yellow metal bolts, 5½d.; condenser plates, 5½d.; wrought copper boat nails, 8½d. per lb.; and copper bolts, £58 per ton.

Imports of timber have been moderate, and there has been a fair demand, with the result that stocks, as a rule, are not excessive; generally there is more inquiry, with prices steady, although low. Of East India teak both logs and planks have been imported more moderately, but there is only a slow demand, and prices are low, with stocks excessive. One cargo of greenheart has arrived; the consumption has been moderate considering the time of the year, and stocks are ample.

All descriptions of round coal continue extremely difficult to move away, and, although pits are only working about three days per week, supplies are in excess of the demand, with prices weak. For house-fire qualities there is, of course, only the most limited summer demand, but list rates are nominally maintained except in special cases, as concessions would not at this time of the year bring forward any appreciable increase of business. Steam and forge coals are only in poor request, with prices cut very low owing to the competition of supplies coming in from outside districts, and 6s. is about the average figure for ordinary qualities at the pitmouth. Collieries have no difficulty in moving their present small output of engine fuel, and prices are maintained at late rates, but there are considerable stocks held at some of the collieries which come upon the market, and tend to prevent any advance being got; common slack is still obtainable at 3s. 6d., and better sorts 4s. 6d. to 5s. per ton, at the pitmouth.

For shipment prices rule excessively low, and Yorkshire coal has been supplied to vessels on the Mersey at prices which local colliery owners apparently are not able to accept. Common steam coal has been sold at 7s., and 7s. 3d. to 7s. 6d. are the average figures delivered Mersey ports.

## BELFAST TRADE NOTES.

(From our own Correspondent.)

THE yards closed on the 11th for the usual summer holidays, and the completion of contracts naturally suffered to the extent of about ten days. Most of the men turned in on Monday, 22nd, and work has been proceeding briskly from that date.

The events of interest since my last Notes were the launches of the largest cargo boats in the world, viz., the *Georgic* for the White Star Line, and the *Victorian* for Messrs. F. Leyland & Co., Liverpool, both from the yard of Messrs. Harland & Wolff. The *Georgic*, which came off on June 22nd, is by far the largest cargo boat in the world; in fact, her gross tonnage is only exceeded by two boats afloat, viz., the *Campania* and *Lucania*, the Cunard Co.'s latest production in flyers. The dimensions of the *Georgic* are:—Length B.P., 557 ft.; breadth, moulded, 60 ft.; depth, m., 40 ft. Net register tonnage, 6,580; gross, 10,000; her deadweight capacity will amount to about 16,000 tons. She will have accommodation for over 900 head of cattle, in addition to a number of specially-fitted stalls for horses.

The engines (by the builders) consist of a pair of four-cylinder triple-expansion of the latest type, with boilers to suit; the power will be sufficient to propel this leviathan at an average speed of 12 knots loaded at sea. The engines and boilers are in, and the masts and funnel up, and the ship is being rapidly pushed on. I hope to be able to record her trial in my next Notes.

The *Victorian*, which Messrs. Harland & Wolff launched on Saturday, July 6th, is the second largest cargo steamer in the world. She is 512 ft. in length, and her gross tonnage is 8,730. She will have four pole masts, and will be fitted with all the most approved appliances for working of ship and cargo. Her machinery consists of a set of triple-expansion engines, constructed by the builders. As previously stated, the vessel has been built to the order of Messrs. F. Leyland & Co., Liverpool, and is intended for the Liverpool and Boston trade.

Messrs. Harland & Wolff have two other steamers of similar dimensions to the *Victorian* on hand for Messrs. Leyland, one of which will shortly be launched. The large steamer *Statesman*, built by Messrs. Workman, Clark & Co. to the order of Messrs. T. & J. Harrison, Liverpool, had her trial trip in Belfast Lough on Wednesday, July 10th, and attained a speed of 18 knots per hour, which was considered satisfactory by both owners and builders. The *Statesman* is a fine specimen of a modern cargo boat, having all the latest appliances for the handling of cargo of all descriptions; the masts having no rake, the cargo can be discharged and loaded with more dispatch, and heavier weights can be lifted. The *Statesman* is intended for Messrs. Harrison's New Orleans trade, and is sure to prove a worthy companion to her predecessors from the yard of Messrs. Workman, Clark & Co.

The s.s. *Ardandearg*, whose launch was reported in our July number, is almost ready for sea, and will have had her trial trip by the time this reaches our readers' hands. She has been built by Messrs. Workman, Clark & Co. to the order of Messrs. Clark & Service, of Glasgow.

Messrs. Workman, Clark & Co. have the s.s. *Voltaire*, of the Belfast and Liverpool Line in for repairs and overhauling.

They have a large steamer in an advanced state in their North Yard which should be launched by the time this reaches our readers' hands. The fine new steamer *Duke of Lancaster*, the latest addition to Belfast and Fleetwood Line of steamers, owned by the Lancashire and Yorkshire, and London and North-Western Railway Co.'s, arrived in Belfast on Tuesday morning, the 9th July, on her maiden voyage. She performed the trip from Fleetwood in 6 hrs. 20 min., giving a mean speed of 17 knots per hour. The *Duke of Lancaster* is a twin-screw steamer of 1,800 tons register, and has been built by the Naval Construction and Armaments Co., Barrow, and is a fine specimen of naval architecture of the present day. She has sleeping accommodation for 230 first-class passengers. There are twelve special staterooms opening off the main first-class entrance. Altogether the ship is registered by the Board of Trade to carry 800 passengers. Her



fittings are of the most elaborate and substantial description. The main saloon is fitted in teak and satinwood, and is enriched by very effective carving. The ladies saloon is a charming apartment, and is very prettily and effectively decorated, the satinwood panels being hand-painted. The vessel was built to steam 17 knots under natural draught, and 18½ knots under forced draught. The vessel altogether reflects great credit on the Barrow Co. The Fleetwood and Belfast service have now a fleet of the finest channel steamers in the world, and no doubt the enterprise shown by the railway companies will meet with the encouragement due to them from the public.

## NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

**Barrow-in-Furness.**—The launch of H.M.S. *Powerful* at Barrow, on Wednesday, July 24th, was the most important event which ever occurred in the history of Barrow. In previous years the Barrow Co. has been entrusted with more or less important orders from the Admiralty, but it was not until the company were commissioned to build the first-class cruiser *Powerful* that Barrow was recognised as in the front rank of the shipbuilding world. True, at Barrow such high-class ships as the *City of Rome*, the *Empress of India*, *Empress of Japan*, *Empress of China*, the *Normandie*, proved the capacity of the Barrow yard for undertaking this class of work, and in the building of the three second-class cruisers of the *Latona* type, the three torpedo gunboats of the *Javelin* type, and the three torpedo-boat destroyers of the *Sturgeon* type. Barrow fairly won a distinguished position, not only for the high-class finish of the work done, but for the high speeds attained by the engines, with which all these ships were fitted. Now the successful launching of the biggest cruiser ever built for the Navy within eighteen months of the time at which the order was given out, is a proof of the ability of Barrow builders to deal successfully with even the heaviest and most powerful type of war vessels going. The claims of Barrow in the shipbuilding world to a fair share of the orders given out by the Admiralty must now be recognised, and it will be strange if when next big line-of-battle ships are given out to private yards, the North Lancashire firm does not get a chance. It is a fact that the Barrow Co. put in the lowest tender for the building of the last two battleships placed with Messrs. Laird, of Birkenhead, and Messrs. J. & G. Thompson, of Clydebank, but as both these firms had had experience in the building of line-of-battle ships, and as Barrow already had a big programme of work in hand for the Admiralty, it was thought advisable to go past them with this big order, but subsequently the Barrow Co. received a supplementary order for the building of the two second-class cruisers *Juno* and *Doris*. There is still a desire, which is quite natural and laudable, to secure the order for a big line-of-battle ship here, and it is quite on the cards that not only will Barrow receive due recognition on this point at no distant date, but that foreign powers requiring big line-of-battle ships will be led to come to Barrow for some of the vessels they require. There is much significance in the remark made after the launch of the *Powerful*, by the Duke of Devonshire, who is Lord President of the Council. He said, "It is a matter of the highest importance not only to the shareholders of this company, but also to this great town of Barrow, where the shipbuilding industry occupies so important a position, and I cannot help feeling that the continued prosperity and existence of great shipbuilding concerns such as this, and also that presided over by Sir Edward Harland, the head of the great shipbuilding works at Belfast, whom I am glad to see here to-day, I cannot doubt, are of great national importance. Their efficiency and prosperity should be maintained, and it would be a very unfortunate state of things if we continued to place all Admiralty orders with Government dockyards, because there are no more important national considerations than the prosperity and efficiency of the great private manufacturing yards." This means, if it means anything at all, that the Duke of Devonshire, as Her Majesty's minister at the head of the Admiralty and Army Departments, sees the necessity of keeping private yards going on Admiralty work, so that they can always be ready in an emergency to concentrate all their capabilities if necessary, in an emer-

gency on the work of maintaining the efficiency of the Navy. Mr. B. Martell, of Lloyd's, further augmented the position taken up by the Duke of Devonshire by stating, "I don't hesitate to say that no better specimen of ship construction can be produced than I have been able to see done in this magnificent ship *Powerful*. Well, knowing this to be the case, I can only congratulate the Admiralty and their enlightened policy in placing some of these magnificent ships in the hands of great establishments such as this at Barrow, which are really important adjuncts to the royal Naval yards. Seeing we have now, as his Grace has said, become alive to the necessity of paying regard to our first line of defence, and keeping up a powerful fleet that shall safeguard the commerce of this country, we can only hope that a greater number of these ships than has hitherto been will be placed in the care of the great private yards of the country, so that they can support the great Naval yards of the Government. There is no doubt that the manner in which they can produce with all the facilities I can see here capable of producing ships of the largest size, and of the very highest quality, we should place out a fair proportion of Government ships with private yards as compared with the dockyards. We don't wish for a moment to deprecate the royal dockyards, or take away from them what the Government think should be placed in them, but all their time may be taken up some time, and not far distant perhaps, when all their services will be required to attend to the repairs of ships. What an enormous advantage it will be to have great establishments, such as this, where Government ships of the first order and highest class can be turned out in the shortest space of time, as in the case of the great ship launched to-day." One other interesting feature in connection with the launch of the *Powerful* was afforded in the speech of Mr. James Huddart, who has taken much interest in the scheme for providing first-class "high flying" Atlantic liners to trade between Great Britain and Canada in connection with the Canadian Pacific Railway, and thence by shipping to the far East, Australia and elsewhere. He said:—"I suppose it would be insincere for me if I did not feel in being asked to reply to this toast, if I did not attribute it to the fact that I have had the great honour and responsibility placed upon me of trying to create a steamship company which shall supply for Canada and this Empire a service between this great country of ours and the dominion of Canada. It would give us a great deal of pleasure if we could get into close business touch with the Naval Construction and Armaments Co. for the building of one or more of these great steamships which as yet are only in the brains of man. All we want, ladies and gentlemen, is the money. You are aware that the Canadian Government have placed on the statute book the intention to give us £150,000 in consideration of running a 20-knot mail service. So far so good. Canada has been generous. Canada desires to see her national life developed, and she is prepared to pay a reasonable price for that. Although Canada is the predominant partner, this question is not limited to Canada. For a long time the Imperial Post Office in St. Martin's-le-Grand has been asking Canada to supply a 20-knot service to that colony, and we are now asking the Imperial Government for half the subsidy we are prepared to find ourselves, and we are prepared to set against that the postage stamps paid to these ships as mail carriers, and we are also prepared to offer to the Admiralty four Atlantic steamships with highly developed horse power—ships very much of the type of the magnificent steamship now employed between England and New York for their service. The Admiralty will have possession of these ships whenever they want them, and also the revenue from postage stamps earned, if they will find the subsidy of £75,000 per annum, which I think is a very reasonable amount. So far as the practical part of the scheme is concerned there is another feature which must be recognised—I mean communication through British territory to British possessions in the East, Australia and India, as well as China and Japan. We have done something during the last twelve months to educate the British public, and I may state that in Canada and Australia, as well as in the United Kingdom, it has been our duty to keep this question quite apart from party politics, because it is a national and imperial question; but we will say this: we don't feel we have anything to lose in promoting this great project by the incoming of the present Unionist Government." It is known that the Barrow Co. for some time past

has been busy looking after the orders which are likely to be placed, some say soon, for the building of four new Atlantic liners for this service. The late Mr. Bryce-Douglas devoted much attention to this subject, and his successor in the managing directorship of the Barrow Co., Mr. Adamson, has also concentrated his attention on the matter. It is probable that in the course of a short time the scheme will gain fruition, and that British builders may expect as a consequence some new and important orders to engage their attention. The engines of the *Powerful* are fairly well advanced, but there is a strike of engineers with reference to some work which they claim to be theirs, but which has hitherto been done by the Iron-shipbuilders' and Boilermakers' Society, and this may cause a delay, which the company is anxious to avoid, in the early delivery of the *Powerful*. Much progress has been made in the construction of the *Juno* and *Doris* second-class cruisers, and it is probable both these vessels will be launched before Christmas. The sand dredger for the Mersey is getting well forward in plating. The only other order in hand on this side of the yard is one booked during the month for Messrs. Argyle, Irvine & Co., of the Clan Line, with the option of a second ship. Prospects generally in the shipbuilding world are very poor at present, as there are not many enquiries for new tonnage, but a much better feeling has arisen during the last few weeks, and that is likely to lead to business.

**Maryport.**—There is still a steady business doing in shipbuilding at Maryport. Builders there do not wait for orders, but they are generally able to dispose of their craft by the time they are ready to go to sea. On Wednesday, the 24th inst., Messrs. Ritson launched a fine steel barque. The vessel is the largest ever built at Maryport, her length being 280 ft. by 41 ft. broad, while her registered tonnage is 1,960, and her carrying capacity 3,500. The vessel is built on the same lines as the *Lada*, which was launched last year, and has proved herself a good seagoing boat and a fast sailer. She has been purchased by Messrs. Rickmers, of Bremerhaven, at which port another firm of German shipowners, who some time ago purchased the *Carl* from Messrs. Ritson, carry on their business, and this second purchase by Bremerhaven firms proves that Messrs. Ritson's ships are making themselves a reputation among the Germans. In designing the ship, special care was given to providing comfortable and commodious accommodation for the officers and crew. She has a full poop aft, with bath-room and sitting-room for the captain, and her cabins are handsomely finished with hard wood, and upholstered in crimson Utrecht velvet. The apprentices and petty officers have a house provided for them aft; while a larger house forward will accommodate the crew. The vessel was launched successfully about one o'clock, broadside on, in the presence of a large crowd of spectators. Master Robert Ritson performed the christening ceremony, naming the vessel the *Willy Rickmers*.

**Whitehaven.**—The attempt to dispose of the shipbuilding yard at Whitehaven has again failed, although it is known that any likely purchaser who would work the yard could acquire it for an old song. It seems probable, seeing the great competition in the shipbuilding trade generally, and the fact that the yards in the country are already capable of turning out double the tonnage which the orders offering provide, there is not much prospect of this yard at Whitehaven ever being put again in operation.

**Steel Shipbuilding Material.**—There is a fair demand for steel shipbuilding material and the mills at Barrow are fairly sold forward. An occasional stoppage of the mills for a week takes place, which would probably not be the fact if makers were fully sold forward. There is some chance of good orders coming to hand outside Barrow, as the local company have especially good facilities for cheap delivery by sea to many ports where there is a demand for plates and shipbuilding sections generally. There is a good demand for heavy steel castings, and makers are well sold forward in that department. Barrow has indeed made for itself a good name in this class of work, and it is one of the departments of the local steel trade which may be looked forward to in the future to be kept busily employed.

**The Hematite Trade.**—This trade during the month has fluctuated considerably, owing chiefly to speculative causes. The actual consumption of pig-iron has not increased, nor has the make of the furnaces, but there have been spurts in the demand caused by operations in hematite warrants, and these have led to upward and downward movements in prices. At the close of the month hematite warrants have been at 45s. 1d. sellers net cash, and 45s. buyers, while makers have been quoting 46s. for

mixed Bessemer numbers net free on board. Stocks of hematite warrants have increased during the month fully 5,000 tons.

### Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from June 14th, to July 10th, 1895.

- 11512 J. B. Hope and R. T. Briggs. Feed water apparatus.
- 11531 A. J. Boulton. (G. J. Dechenne, Belgium). Lubricators.
- 11561 C. H. Keats. Vessels.
- 11566 E. E. Sale. Stuffing-box for reciprocating rods of steam engines, &c.
- 11569 J. Weir. Direct-acting steam pumps.
- 11574 R. Brown. Ships' side lights.
- 11590 R. Bennett. Watertight compartment for boats.
- 11591 Agar, Cross, and Co. (E. Stinton, Argentine Republic). Boiler furnaces.
- 11596 W. Northeast. Landing nets.
- 11610 W. P. Thompson (L. Klima, Austria). Life saving device.
- 11621 F. Trigalles. Fire-boxes for boilers.
- 11645 T. A. Kennedy. Boat lowering apparatus.
- 11663 J. White. Manhole doors for cylinders.
- 11689 W. Schmidt. Draught conduits of boilers.
- 11735 T. Lees and B. Lees. Cut-off valves for steam engines.
- 11738 G. Taylor, jun. Piston valves.
- 11779 J. E. Weyman. Oil engines.
- 11791 S. D. Dyer. Water-gauge glass protector for steam boilers.
- 11800 J. G. A. Kitchen. Non-return valves.
- 11802 A. G. Midford. Raising sunken vessels.
- 11810 G. Barker (C. Heinrich, United States). Centrifugal lubricator.
- 11846 H. Mullens and A. Lewis. Boat-lowering apparatus.
- 11886 J. J. Mather. Pneumatic pontoons flotilla.
- 11911 T. Smith and J. Ridgway. Machine tools.
- 11928 E. Towilson and T. Andrew. Steam engines.
- 11955 L. B. Atkinson. Internal combustion engines.
- 11959 T. Sugden. Preventing incrustation in boilers.
- 11983 S. Garson, A. Nixon, and J. S. Armstrong. Steam boilers.
- 11989 E. N. Bessant. Hot water cylinders.
- 11991 E. Robson. Low water alarm valves for boilers.
- 12037 T. Taylor. Steam generators.
- 12063 O. L. Nielsen and H. F. Fourny. Board for trawl net.
- 12090 J. Johannsen. Propellers for steering ships.
- 12122 E. B. Newlove and H. W. Hill. Steam boilers.
- 12133 W. Sharples and T. Forrest. Steam engine valves.
- 12194 W. Garner. Steam boilers.
- 12204 F. Wilson. Heating feed-water for engines.
- 12224 A. V. Newton (A. Nobel, Sweden). Armour plates.
- 12248 W. M. Walters. Metallic packing.
- 12268 W. P. Thompson (A. L. Olsen, Denmark). Repairing ship's propellers.
- 12287 Brayton Petroleum Motor Company and S. Withers. Petroleum engines.
- 12288 W. B. Lake (H. B. Fay, United States). Steam engine valves.
- 12402 A. H. Cannon. Lubricators.
- 12465 K. Moscicke. Controllers for steam engines.
- 12489 W. Johnston. Trawl nets.
- 12496 W. D. Wight, M. B. Wild, and T. Rydor. Valves for steam engines.
- 12501 A. Webster. Purification of feed water.
- 12511 W. H. Smith and W. Eastwood. Steam engines.
- 12518 H. E. Rottmer. Boat detaching device.
- 12551 W. H. Harfield. Steering gear for boats.
- 12604 D. J. Morgan. Multitubular boilers, &c.
- 12620 K. J. A. Isakson. Decreasing ships' rolling.
- 12631 W. P. and T. Fox. Engineers' ratchet braces.
- 12646 J. Maurice. Compass deflector.
- 12648 A. Stirling. Steam generators.
- 12655 R. J. Bott. Scrapers for water-tube boilers.
- 12679 V. I. Feeny (G. Colomb, France). Grates for furnaces.
- 12689 J. Y. Johnson (the firm of Carl Pieper, Germany). Boilers.

## LAUNCHES AND TRIAL TRIPS.

## LAUNCHES—ENGLISH.

**Titania.**—On June 22nd Messrs. Bartram launched at Sunderland a steel screw steamer for Messrs. C. Howard & Sons, London. The vessel is of the spar-deck type, with poop, long bridge, and topgallant forecastle, and is of the following dimensions:—Length, 350 ft.; breadth, 45 ft.; depth, 26 ft. 9 in.; gross tonnage, 8,470. She has been built to take the highest class in Lloyd's registry. The engines will be supplied by Mr. John Dickinson, and the cylinders are 24 in., 39 in., and 64 in. diameter, and the stroke 42 in. The vessel was named the *Titania* by Mrs. Charles W. Howard, of London.

**Duchess of York.**—On June 25th the steel screw steamer *Duchess of York* was launched by Messrs. Blumer & Co., at Sunderland. The vessel is of the following dimensions:—Length, between perpendiculars, 300 ft.; beam, 41 ft.; depth, moulded, 21 ft. 6 in.; class 100 A1; partial awning deck. The engines and boilers are being constructed by Messrs. Blair & Co., Limited, Stockton, and have cylinders 22½ in., 36½ in., and 60 in., by 39 in. stroke. This vessel has been constructed by Messrs. Robinson Brothers, of Whitby.

**Steel Screw Steamer.**—On Saturday afternoon, July 6th, Messrs. Richardson, Duck & Co. launched from their yard a steel screw steamer of the following dimensions, viz.:—Length, over all, 842 ft.; beam, extreme, 43 ft.; depth, moulded, 29 ft.; deadweight, 5,250 tons. This vessel, which is of the spar deck type, will class 100 A1 at Lloyd's, and has been built under special survey. She has a break poop for cargo, bridge over engines and boilers, and a break forecastle, in which crew are berthed. Accommodation for captain and officers is in 'tween decks and amidships, and engineers in a deck house abaft engine-room. A cellular double bottom and after peak tank are fitted for water ballast, and the equipment includes five steam winches, large donkey boiler, steam windlass, stockless anchors, steam steering gear, and all modern appliances for speedy loading and discharging. The engines, by Messrs Blair & Co., have cylinders, 23½ in., 39 in. and 64 in., 42 in. stroke, steam being supplied by two single-ended boilers, with a working pressure of 160 lbs.

**Florida.**—On July 8th Messrs. Ropner & Son, Stockton-on-Tees, launched a fine steel screw steamer, the dimensions of which are as follows, viz.:—Length, perpendiculars, 330 ft.; breadth, extreme, 45 ft.; depth, moulded, 29 ft. 6 in. She has been built to the order of a Norwegian firm, Messrs. Ropner & Son having built several other steamers for the same owners; the vessel is built off the spar decked rule and has poop, bridge, and topgallant forecastle. The saloon and cabins for captain and officers will be fitted up in the poop, and accommodation for engineers will be provided amidships, the crew being berthed in the forecastle as usual. She has a double bottom on the cellular principle for water ballast, and has been designed to carry a deadweight cargo of 5,550 tons on Lloyd's summer freeboard. The vessel will have all the most recent appliances for the expeditions and economical loading and unloading cargoes; has direct steam windlass, steam steering gear amidships with powerful screw gear aft, four large steam winches worked by a large multitubular D. boiler, stockless anchors, &c. She will be fitted with a set of triple-expansion engines by Messrs. Blair & Co. The vessel was named the *Florida* by Mrs. Schylder, wife of the captain of the sister steamer launched last month.

**Acacia.**—On July 8th there was launched by Messrs. Pickersgill, at Southwick, Sunderland, a steel screw steamer built to the order of Messrs. J. Lilly & Co., of West Hartlepool, of the following dimensions:—Length, 295 ft.; breadth, 42 ft. 3 in.; depth, 17 ft. 2 in. The ship will take the highest class at Lloyd's and is of the partial awning deck type. The engines have been built by Messrs. George Clark, Limited, and are of the triple-expansion type, having cylinders 21 in., 35 in., and 57 in., by 39 in. stroke. The vessel was named the *Acacia*.

**Vagliano.**—On July 9th there was launched by Messrs. Robert Thompson & Sons, from their Southwick Yard, the steel screw steamer *Vagliano*. The following are her dimensions:—Length, between perpendiculars, 310 ft.; breadth, 41 ft. 3 in.; depth, moulded, 21 ft. 2½ in. Class 100 A1. Built on the improved partial awning deck system, the partial awning deck extending to after hatch, with turtle back, covering stern and connected to house on deck. Cellular bottom and fore and

after peaks for water ballast. Four large steam winches and two multitubular donkey boilers for rapid discharging of cargo. Steam capstan windlass. Accommodation for captain and officers in large deck house, fitted up in polished oak. Accommodation for the engineers is at the after end of engine-room. Petty-officers, crew and firemen in forecastle. The engines, which are being supplied by Messrs. John Dickinson & Sons, Limited, have cylinders, 28 in., 37 in. and 60 in., by 42 in. stroke with two large boilers, with a pressure of 165 lbs. During construction, the hull and machinery have been superintended by Mr. William Law, of Liverpool. As the vessel left the ways, she was gracefully christened the *Vagliano* by Miss Laurel Thompson.

**Dorothea Rickmers.**—On July 9th there was launched from the Walker Shipyards, on the Tyne, a large steel cargo steamer *Dorothea Rickmers*, built for Messrs. Rickmers, the well-known merchants of Bremen. The principal dimensions of the vessel are:—Length, 340 ft.; breadth, 44 ft.; depth in hold, 25 ft. 8 in. She has been built under Lloyd's supervision to their 100 A1 class. The vessel was taken to the Wallsend Slipway and Engineering Co.'s works, where the machinery will be fitted on board.

**Lestris.**—On July 9th Messrs. Wigham Richardson & Co. launched at Newcastle-on-Tyne a steel screw steamer, which they are building to the order of the Cork Steamship Co., of Cork. The vessel is 255 ft. in length by 33½ ft. beam, and she was named the *Lestris*.

**Rauma.**—On Tuesday, July 23rd, there was launched from the Cleveland Dockyard of Sir Raylton Dixon & Co., Middlesbrough, a large steel spar deck steamer, which has been built to the order of Captain Andreas Olsen, of Bergen, under the supervision of Captain Laading, being the seventeenth steamer they have built for Norwegian owners. The vessel has been constructed to take Lloyd's 100 A1 class and the highest class in Norske Vari. Her principal dimensions being:—Total length, 331 ft.; between perpendiculars, 320 ft.; beam, 42 ft. 6 in.; depth, moulded, 28 ft. 3½ in. The spar and main decks are of iron and steel, and the poop, bridge and forecastle decks of pine. She is fitted with extra strengthening at the bows to withstand the pressure of ice, water ballast in cellular bottom, five bulkheads, Sidgwick's patent hinged topmasts, and has a deadweight carrying capacity of over 5,000 tons. The accommodation for captain, officers and engineers is handsomely fitted and placed under the bridge, and the crew are berthed under the topgallant forecastle. Powerful triple-expansion engines, having cylinders, 24 in., 38 in., 64 in. by 42 in. stroke, with two large steel boilers, working at 160 lbs. pressure, will be fitted by Messrs. T. Richardson & Sons, Limited, Hartlepool. On leaving the ways she was named *Rauma* by Mrs. Laading, wife of the captain.

**Argo.**—On Tuesday, July 23rd, Messrs. Wm. Gray & Co., Limited, launched a fine large steel screw steamer, which they have built to the order of Messrs. Rickinson, Son & Co., of West Hartlepool. She will take Lloyd's highest class, and is of the following dimensions, viz.:—Length over all, 336 ft.; breadth, 47 ft.; depth, 24 ft. 10 in., and the deck erections consist of a half-poop, bridge over the machinery space, and a topgallant forecastle. A handsome saloon and state-rooms, together with the captain's and officers' rooms, will be fitted under the poop. The hull is built with web frames, and cellular double bottom for water ballast. Six steam winches, steam steering gear amidships and screw gear aft, patent direct steam windlass, patent donkey boiler, steel longitudinal grain divisions, stockless anchors, and a complete outfit will be fitted for a first-class cargo boat. Fine engines on the three cylinder triple-expansion principle are being supplied by the Central Marine Engine Works of Wm. Gray & Co., Limited. They will develop over 1,200 H.P. The cylinders are 24 in., 38 in., and 64 in. diameter, with a piston stroke of 42 in., and fine extra large steel boilers having a pressure of 160 lbs. per square inch, will give an ample supply of steam. A special feature, also, is the adoption of Messrs. Kitching & Smith's improved stern tube and propeller shaft arrangement, which prevents the rapid deterioration of the shaft that occurs in ordinary circumstances. The construction of the ship and machinery have been under the superintendence of Mr. Chas. E. Smith, on behalf of the owners, and the ceremony of christening the steamer *Argo* was gracefully performed by Mrs. John Rickinson, of West Hartlepool.

**Otter.**—On Tuesday evening, July 23rd, there was launched from the shipbuilding yard of Messrs. Cox & Co., Falmouth, a handsomely modelled yacht, built to the order of Neville Grenville, Esq. As the vessel left the ways she was gracefully named the *Otter*, by Mrs. Neville Grenville. The yacht is built of steel and is classed by Lloyd's. Handsome accommodation is provided under the raised quarter deck for the owner and friends, consisting of spacious saloon, state-room, bath-room, &c. Forward ample accommodation is provided for master, officers, steward and crew. The vessel is fitted with bridge, chart-house, large deck-house, steam steering gear, steam windlass, steam launch, and all the latest improvements that add to her efficiency and comfort. Her dimensions are:—Length, 100 ft.; breadth, 18 ft.; depth, 10 ft. 4 in. Engines, compound surface; condensing-cylinders, 15½ in. and 30 in.; stroke 21 in., working pressure, 110 lbs.

**Aureole**—On Wednesday, July 24th, there was launched from the yard of the Tyne Iron Shipbuilding Co., Limited, Willington Quay-on-Tyne, a large steamer to carry oil in bulk, which has been built to the order of Messrs. Hunting & Son, of Newcastle-on-Tyne. The vessel is of the following dimensions:—Length, 356 ft.; breadth, 47 ft.; depth, 30 ft. 3 in.; to class 100 A1 at Lloyd's, on the spar deck principle, for carrying petroleum in bulk, and is to have engines with cylinders 27 in., 44 in., and 71 in., and 48 in. stroke. These will be supplied by the Wallsend Slipway and Engineering Co., Limited, of Wallsend-on-Tyne. On leaving the ways the vessel was named the *Aureole* by Mrs. C. S. Hunting, of Easingwold.

**Pectan.**—On Wednesday, July 24th, Messrs. Wm. Gray & Co., Limited, launched the splendid steel screw steamer *Pectan*, the seventh steamer they have built for Messrs. Samuel & Co., of London, for the bulk petroleum trade to the East, through the Suez Canal. The *Pectan* is the largest bulk oil steamer afloat. She will take Lloyd's highest class, and her dimensions are:—length over all, 388 ft.; breadth, extreme, 48 ft.; depth, 31 ft. 6 in. with full poop, bridge and fore-castle. The engine and boiler-rooms are in the after part of the vessel, and underneath them there is a double bottom for water ballast. The forward and after peaks and deep tank, and the forehold are also fitted for water ballast for trimming purposes. Forward of the boiler-room there are eleven strong transverse bulkheads, and also a very strong fore-and-aft bulkhead from the keel to the main deck. Altogether there are fifteen separate oil tanks. These oil tanks are separated from the boiler-room and bunkers aft, and from the cargo hold forward by large cofferdams, which are carried to the upper deck in each case, and which can be filled with water, or used for carrying fish oil, or for ordinary cargo when required, and they are under the control of special and separate pumps. Expansion trunks are carried up from each oil compartment to allow the oil to rise and fall with varying temperatures. These trunks, in conjunction with large hatchways, will be used for loading general cargo. Two powerful pumps are fitted in the pump-room amidships for discharging the oil cargo. They will also pump water from the sea to fill the oil tanks when required for water ballast. When the oil cargo has been discharged, the tanks will be cleansed and adapted to receive general cargo, by special means provided. A powerful fan will be fitted capable of exhausting the air from each tank in ten minutes in order to thoroughly ventilate the compartment when filled with general cargo, the exhaust air being delivered through a cowl a good way above decks. The vessel will be fitted throughout with an electric light installation by Messrs. Clarke, Chapman & Co., of Newcastle-on-Tyne, lighting the whole of the cabin, engine and boiler-room, galley, chart and wheel-house, binnacle and telegraphs, &c. In addition she will have a 20 in. projector and the necessary lighting for navigating the Suez Canal at night. In order that all parts of the ship may be thoroughly examined after the cargo has been discharged, she will be provided with a number of portable lamps. The cabin, fore-castle and petty officers rooms will be all heated by steam, so as to avoid any risks of fire. The accommodation of captain, officers and the saloon are amidships, the engineers' rooms in a large house on deck aft and the crew forward. A patent steam steering gear will be fitted and screw gear aft, patent steam windlass, multitubular donkey boilers, patent stockless anchors, and in addition to all the necessary fittings and outfit for the oil trade, there will be a complete outfit for working general cargoes, including eight steam winches with

derrick to each. Three masts will be fitted and neatly rigged, and awnings all fore and aft for the Eastern climate. Great care has been taken to ensure strong and sound work. The rivetting is closely spaced in shell plating, decks, and bulkheads, and in order to reduce as far as possible the number of joints in way of the oil tanks the shell plates are extra long. The vessel will be fitted with a very powerful set of triple-expansion engines of the well-known type manufactured by the Central Marine Engine Works, of William Gray & Co., Limited. The cylinders will be 27½ in., 43½ in., and 78 in. in diameter, respectively, and of 48 in. stroke. An extra large amount of boiler power also is provided in the shape of three large single-ended boilers working at a pressure of 160 lbs. per square inch. Increased safety is ensured by placing two of the boilers with their backs towards the cofferdam, removing the heat of the stokehold a considerable distance from the bulkheads. The engines are capable of driving the ship at a high rate of speed when loaded, and are furnished with all the latest improvements. The engine-room contains also one of Mudd's patent feed-water evaporators, which is designed on a plan greatly facilitating cleaning and examination. The vessel and machinery have been built under the superintendence of Messrs. Flannery, Baggallay & Johnson, of London. The ceremony of naming the steamer *Pectan* was gracefully performed by Miss Jessie Mulliner, Roseneath, Whalley Range, Manchester.

#### LAUNCHES—SCOTCH.

**Dania.**—On June 25th Messrs. Russell & Co. launched from their Greenock yard a steel screw steamer named *Dania*, built to the order of Messrs. Hecksher & Co., Copenhagen. Dimensions:—Length, 352 ft.; breadth, 48 ft.; depth, 29 ft.; and of 5,450 tons carrying capacity. Messrs. Fleming & Ferguson, Paisley, will supply triple-expansion engines. The *Dania* is to trade between the Baltic and Mediterranean ports.

**Progress.**—On June 25th the *Progress*, a screw tug steamer of 76 tons gross and 75 ft. long, built by Messrs. Gourlay Bros. & Co., Dundee, to the order of Mr. J. P. Bruce, Dundee, on behalf of a Russian firm, was launched with all the machinery, &c., on board. She will proceed to Archangel in a few days.

**Craigmore.**—On June 25th Messrs. A. Rodger & Co., Port-Glasgow, launched from their shipbuilding yard a handsome steel sailing ship of about 1,850 tons net register, built to the order of Messrs. Thomson, Dickie & Co., 17, Royal Exchange Square, Glasgow, managing owners of the Maiden City Line. The ship took the water in fine style, after being named the *Craigmore* by Mrs. Robert Dickie, Elsinore, Pollockshields. The good ship was at once taken to the quay to receive her lower masts, and the owners and a large party of friends adjourned to Messrs. Rodger's model room, where luncheon was served, covers being laid for fifty. Mr. Rodger presided, and Mr. Dickie acted as croupier. After the usual loyal toasts, Mr. Rodger proposed prosperity to the firm of Messrs. Thomson, Dickie & Co., and success to the good ship *Craigmore*, which they had just seen launched. He referred in eulogistic terms to the success which had attended the management of those owners, and he felt assured that in the *Craigmore* they had a vessel which would prove a good dividend-earning concern. The time of depression which had obtained during the last few years was now passing away, and all shipowners were looking forward to a season of better times, and he believed that the *Craigmore* would be in the forefront in the returns which she made. Mr. Dickie, in responding, said that he had difficulty in replying to the flattering remarks which Mr. Rodger had made. He could not claim that they had attained the high ideal which Mr. Rodger had indicated, but it would always be his firm's endeavour, by the closest personal attention to the *Craigmore* and the other ships of their fleet, to merit the confidence and esteem of their shareholders. Mr. Rodger had referred to the time of depression, which they all fondly hoped was now passing away, and he (Mr. Dickie) stated that he might mention that at the time the *Maiden City* was built they were at the end of another such season of depression, and she took the tide at the turn and was so successful that at the end of her third voyage she had returned to her shareholders over 70 per cent. of her cost. He hoped that the *Craigmore* would prove a repetition of the *Maiden City* in getting the tide at its turn and making handsome returns to her shareholders. He concluded by proposing "Success to the Firm of Messrs. A. Rodger & Co.," to which Mr. Rodger replied appropriately, and there

proposed the health of Mrs. Robert Dickie, who had performed the christening ceremony, which Mr. Dickie briefly acknowledged. Mr. Drysdale proposed the health of Captain Lyddon Veysey, who had been appointed to the command of the good ship. For several years he had been in the *Edenballymore*, and during that time his conduct had been such as to merit their fullest confidence, and he hoped that the success which had attended him during the past would follow him to the new ship. Captain Veysey briefly replied. Dr. Pollok then proposed "The Ladies," which was replied to by Mr. Clancey. The *Craigmore* is a very handsome ship, measuring 265 ft. by 40 ft. by 28 ft. 6 in., about 1,850 tons net register, and designed to carry 3,300 tons of cargo and stores. While fitting out she will load a cargo of coal for Rio de Janeiro, and is expected to sail about the middle of July.

**Euchris.**—On June 26th Lord Lonsdale's new 20-rater, built at Fairlie by Messrs. Fife & Son, was launched. She is a bulb-finner of the most extreme type, and is built of mahogany. She is to be sailed by W. Parker, who is presently in command of Lord Lonsdale's *Dragon* (No. 3). She was christened *Euchris*. Parker, who is to have charge, had charge of the 20-rater *Dierdis* last year, in which he won 37 prizes.

**Alexandra.**—On June 26th Messrs. Lobnitz & Co., Renfrew, launched a screw steamer for the United Steamship Co., of Copenhagen. The vessel will take a cargo of about 3,500 tons, and is also provided with accommodation for a few passengers. The engines are triple-expansion, and have been constructed by the builders. On leaving the ways the vessel was named *Alexandra* by Miss Gertrude Haynes, of Cadiz.

**Chesapeake.**—There was launched on Wednesday, June 26th, from the shipbuilding yard of Messrs. David J. Dunlop & Co., engineers and shipbuilders, Inch Works, Port-Glasgow, the s.s. *Chesapeake*, built to the order of the Anglo-American Oil Co., Limited, of London, for carrying petroleum in bulk. The new steamer which is the fourth that has been built by Messrs. Dunlop for this company, will be the largest oil steamer afloat, her deadweight carrying capacity to Lloyd's freeboard being 6,000 tons, with a gross register of about 4,600 tons. The dimensions of the steamer, are: 385 ft. over all, 370 ft. between perpendiculars, 47 ft. beam, 29 ft. 3 in. depth, moulded to upper deck, and is built to obtain Lloyd's highest class as a petroleum carrying steamer. The type of steamer is that of the three deck vessel, having long full poop extending sufficiently over engine and boiler room to include accommodation for the navigating officers in front of same, with a topgallant forecabin 50 ft. long. The rig is that of a two-masted fore-and-aft schooner with pole masts. The hull is divided longitudinally into 18 compartments by transverse watertight bulkheads. There are 10 double tanks for carrying the oil, the longitudinal middle line bulkhead dividing each of the ten tanks. To preclude the possibility of oil finding its way into the holds or engine and boiler space, a cofferdam 4 ft. long is placed at each end of the two main oil divisions of the steamer. The bulkheads have been designed specially by the builders to resist the severe strains to which they are exposed in the Transatlantic trade. An important feature in the construction of the bulkheads is, that all the caulking can be done in each alternate tank. The whole of the bulkheads dividing oil tanks were subjected to a pressure of 20 ft. head of water above the main deck in the presence of the representatives of the owners and Lloyd's surveyors, and they withstood this unusual test in a highly satisfactory manner as was proved from the fact that no tank had to be filled a second time for testing, all being absolutely watertight. The accommodation for navigating officers is placed in the fore part of the poop and consists of state rooms for captain, officers, engineers, and petty officers, in wings extending the whole length of the engine and boiler space; a large saloon is fitted up in the middle of the ship capable of dining 14 persons, the whole being finished in a first-class style, special attention having been paid to the ventilation, etc. Unlike the company's other steamer, the accommodation for crew and firemen has been placed under the poop aft, and is fitted up in a commodious manner, the extreme height in the 'tween decks being about eight feet, providing ample ventilation and light. The forecabin, which is only intended as shelter for weather, is not inhabited. The vessel is provided with all the latest and most modern appliances for working the ship, including steam-captain, windlass, and steam winch by Clarke, Chapman & Co., steam steering gear by Bow, McLachlan & Co., an installation

of electric lighting by Claud Hamilton, Limited. The machinery consists of a set of triple-expansion single screw engines having cylinders, 27 in., 43½ in. and 70 in. diameter by 51 in. stroke, fitted with Brown's steam and hydraulic starting gear; there are two double-ended boilers constructed for a working pressure of 160 lbs. per square inch. The engine-room auxiliary machinery includes feed and boiler pump engines, Weir's service feed heater, Morison's evaporator, Dunlop's patent steam and pneumatic marine engine governor. The oil pump machinery consists of two "Snow" Duplex pump engines, 12 in. by 12 in. by 12 in., one placed in pump-room aft and one in pump-room forward. A point in the construction of this steamer is the placing of machinery in midships necessitating the constructing of an absolutely watertight tunnel for the main shafting, this tunnel is entirely cut off from communication with the engine-room, the only access to it being obtained from the trunks leading from the poop-deck at the forward and aft ends, this precaution being considered necessary (in the event of any damage to the tunnel through the shaft breaking or any other cause) to prevent the access of oil or oil vapour to the engine room. It may be mentioned that the construction of the *Chesapeake* has been under the direct superintendence of Mr. Blair, chief superintendent of the company, who has been ably assisted by Mr. McEwan, local inspector. On leaving the ways, the ceremony of naming the steamer *Chesapeake* was gracefully performed by Mrs. Jas. McDonald, wife of one of the directors of the Anglo-American Oil Co., Limited, London. After the launch, the company of invited guests met in the private office at Inch Works, where the tables were beautifully laid out and cake and wine served by Mr. John Brown, purveyor, Greenock.

**Lennox.**—On June 26th Messrs. Barclay, Curle & Co., Limited, launched from their shipbuilding yard at Whiteinch, Glasgow, the steel screw steamer, *Lennox*, built to the order of Messrs. John Warrack & Co., Leith, to trade between United Kingdom, China, Japan, and the United States. The dimensions are:—Length, 353 ft.; breadth, 44 ft.; and depth, 28 ft. 6 in. The gross tonnage is about 3,700 tons, and the deadweight carrying capacity about 5,500 tons. She has been built to class 100 A1 at Lloyd's and to Board of Trade requirements for passenger certificate, and is fitted up with all modern appliances for working of ship and cargo. On moving on the ways the christening ceremony was performed by Mrs. John Warrack, jun., Rosebery Crescent, Edinburgh. After the launch the vessel was towed to the harbour to take in her machinery, which is being supplied by the builders.

**Hopper Barges.**—On June 26th Messrs. Fleming & Ferguson launched at Paisley, two steel hopper barges, built to the order of the Admiralty, and intended to be used in connection with the improvements on Gibraltar Harbour.

**Gedric.**—On June 27th Messrs. Hawthorne & Co. launched at Leith a large coal lighter, named the *Gedric*, for the London and Edinburgh Shipping Co.

**Monkbarns.**—There has lately been launched by Messrs. M'Millan & Son, at Dumbarton, a steel sailing vessel of about 1,950 tons register. The ship is owned by Messrs. David Corsar & Sons, of Liverpool and Arbroath, and was named *Monkbarns*.

**Burntisland.**—On June 27th there was launched from the yard of Messrs. John Scott & Co., Kinghorn, a steel screw steamer of the following dimensions, viz.:—250 ft. by 38 ft. by 21 ft. 9 in., to carry 2,850 tons on a light draft of water. She is fitted with powerful engines, the boilers having a working pressure of 200 lb. per square inch. The vessel is the second from the same model built by Messrs. Scott & Co. to the design and order of Mr. Joseph Hault, of Liverpool, for the general cargo trade. The usual christening ceremony was gracefully performed by the wife of Mr. Stewart H. Brown, of Liverpool, and the vessel steamed to Burntisland and was docked the same tide.

**Sunda.**—On June 28th Messrs. Caird launched at Greenock the steamer *Sunda*, for the Peninsular and Oriental Steam Navigation Co. She is a vessel very similar in design and arrangement to the *Malta*, but smaller. The principal dimensions are:—Length, 400 ft.; breadth, 46 ft. 6 in.; and depth, 81 ft., with a deadweight carrying capacity of 6,000 tons. She has superior accommodation for 50 first saloon and 25 second saloon passengers. The saloons, music-room, and smoking-room are from the designs of Mr. Collutt, the archi-



teet of the Imperial Institute, who also designed the saloons of the *Malta*, *Simla*, *Nubia*, *Caledonia*, *Australia*, *Himalaya*, &c. The *Sunda* is fitted with all the most modern appliances for rapid loading and discharging of cargo. Her engines are of the triple-expansion type, capable of driving the vessel at 12 knots fully laden. The boilers are fitted with Howden's system of forced draught.

**St. Abbs.**—On June 28th Mr. Adam Marr launched at Leith, a steam line fishing-boat, built of wood, to the order of Messrs. Robert Hastie & Co., North Shields. The vessel, which is named the *St. Abbs*, is 90 ft. in length, 19 ft. in width, and 10 ft. 6 in. in depth. She will be supplied with compound surface-condensing engines by Messrs. Baird & Barnsley, North Shields.

**Benelutha.**—On July 3rd Messrs. Wm. Hamilton & Co. launched from their Glen Yard, Port-Glasgow, a steel screw tug steamer, for towing purposes on the river Thames, to the order of Mr. Henry Covington, of Battersea, London. The dimensions are as follow:—Length, between perpendiculars, 70 ft.; breadth moulded, 16 ft. 6 in.; depth, 10 ft. She is to be supplied with triple-expansion engines by Messrs. David Rowan & Son, Glasgow, the cylinders being 12 in., 18 in., and 30 in. diameter by 22 in. stroke, and is expected to attain a high rate of speed. As the vessel left the ways she was named *Benelutha*. The builders have under construction for the same owner a typical Thames sailing ketch, which is expected to be launched in a fortnight.

**Simonette.**—On July 4th Messrs. Ramage & Ferguson, Limited, launched a small steam yacht of 20 tons, built to the order of Mr. Alex. Browne, Doxford Hall, Chatham, for duck-shooting purposes. This vessel is of such a draught that she can go into any of the small harbours on the east coast of England, and besides has a good sized cabin, with sleeping accommodation for the owner and friends. The yacht was named *Simonette*, and being completely finished with steam up, immediately went for a trial on the Firth, when the highly satisfactory speed of 8½ knots was obtained.

**Manila.**—On July 5th Messrs. Charles Connell & Co. launched from their shipbuilding yard at Scotstoun, Whiteinch, the steel screw steamer *Manila*, a repeat of the *Cadiz* and *Barcelona*, launched by them recently for Spanish owners. Dimensions are:—390 ft. by 46 ft. by 31½ ft., measuring about 4,800 tons register. Machinery is being fitted by Messrs. Dunsmuir & Jackson, Govan. All the vessels have been fitted with the electric light and accommodation for a large number of emigrants. As the vessel left the ways she was christened in the customary manner by the wife of Captain Ibargaray, who takes command of the vessel.

**Gorica.**—On July 8th Messrs. Ramage & Ferguson, Limited, Leith, launched a steel screw steamer built to the order of Messrs. James Currie & Co., Leith, for their general cargo trade. The principal dimensions of this vessel are:—Length, 230 ft. by 32 ft. beam by 17 ft. 4 in. depth, moulded, and the engines are triple-expansion with cylinders 19 in., 31 in., and 50 in. diameter by 36 in. stroke, supplied with steam from a large single-ended, four-furnace boiler working up to 165 lbs. pressure. This steamer, in addition to being built to Lloyd's highest class, has also been constructed so as to meet the Board of Trade requirements, in the event of a passenger certificate being subsequently required. The facilities for loading and discharging cargo are particularly complete, and all the most modern appliances for the working of a vessel of this size are included in her outfit. On leaving the ways the steamer was named *Corvica* by Miss Leitch, and subsequently the builders entertained a company to lunch, amongst whom were Messrs. Crawford, Walker, R. C. Munro Ferguson, ex-M.P. for Leith, Rev. Mr. Small, Mr. List, &c., when the toasts usual on such occasions were duly proposed and honoured. This is the tenth steamer launched by the same firm for Messrs. Jas. Currie & Co., within the last seven years.

**Moyune.**—On July 8th Messrs. David & William Henderson & Co. launched from their yard at Partick, on the Clyde, a large steel screw steamer which they have built to the order of the China Mutual Steam Navigation Co., of London. The vessel is similar to the *Kaiow*, recently delivered by Messrs. Henderson to the same owners, but of larger dimensions, viz.:—Length, 410 ft.; breadth, 48 ft.; depth, moulded, 29 ft. 2 in.; with a gross tonnage of about 4,650 tons. The vessel is

classed in Lloyd's registry 100 A1 three deck, and is built to the requirements of the Board of Trade for a passenger certificate. The deck erections consist of poop, bridge, and fore-castle, with houses on the bridge for the accommodation of passengers, officers, and engineers. The saloon and state-rooms are handsomely finished and fitted. The crew are berthed forward under the topgallant fore-castle. Awnings are fitted fore and aft. There are two complete steel decks, and the weather decks throughout are sheathed with teak. Water ballast will be carried in the double bottom, both peaks, and a large hold tank, providing a total capacity of about 1,550 tons. The cargo-working arrangements are of the most complete description, there being 10 steam winches of large size. In addition to the derricks on the masts side, derricks are also fitted, and a very large derrick is stepped on deck capable of lifting 30 tons. The vessel is lighted throughout with electric light; has steam steering gear, steam windlass, and a steam warping capstan, and will be rigged as a two-masted schooner. The topmasts will be telescopic, to suit the Manchester Ship Canal. The machinery has been constructed by the builders' firm, and consists of a set of triple-expansion engines, with cylinders 27 in., 46 in., and 76 in. diameter, with a stroke of 60 in. The working pressure will be 180 lbs., steam being supplied by three large single-ended boilers, with Howden's forced draught. The propeller is of manganese bronze. During construction the hull has been under the personal supervision of Captain Kemp, and the machinery under that of Mr. Meiklerfeld, the company's superintending engineer. On leaving the ways the vessel was named *Moyune* by Miss Stewart, of Liverpool, niece of Mr. H. B. Stewart, one of the directors of the China Mutual Steam Navigation Co.

**Konningen Regentes.**—On July 9th there was launched from the yard of the Fairfield Shipbuilding and Engineering Co., Govan, a large steel paddle-steamer, named the *Konningen Regentes*, which has been built by the Fairfield Co. for the Zealand Steamship Co., Flushing. She is the second of three similar vessels which are being built at Fairfield for the same owners, and is intended for mail and passenger traffic between Flushing and Queenborough. Her dimensions are:—Length, between perpendiculars, 320 ft.; breadth, moulded, 35 ft. 6 in.; depth, moulded to upper deck, 24 ft. She is exactly similar to the *Konningen Wilhelmina*, launched on the 23rd of May last. After the launch, the builders entertained a large company in the luncheon-room. Among those present were:—Mr. Richard Barnwell, managing director of the Fairfield Co.; Dr. Bakker, director of the Zealand Steamship Co.; Mr. Lambrechtse, master of works, Amsterdam; Mr. Fakker, of Amsterdam; Mr. C. Sprenger, of Amsterdam; Mr. Teding von Berkhout and Mr. Metz, of the Zealand Co.; Commandante G. M. Pelham Coxhead, of Naples; Mr. Latham Hudden, of Bristol; Mr. J. Lester Clarke, of London; Mr. King, Mr. Meadus, and Mr. Hobbs, of the Admiralty; Mr. and Miss Feldtman and Miss Simpson, of Harrogate; Mr. Ranton, of London; Mr. Sharer and Mr. Laing, of the Fairfield Co.; Commander Marshall, R.N.R.; Mrs. Sharer, wife of the general manager of the shipyard, &c. Mr. Barnwell, after the toast of "The Queen" had been duly honoured, proposed "Success to the *Konningen Regentes*." He referred to the cordial relations which had always existed between the Fairfield Co. and the Zealand Steamship Co. He was glad that Dr. Bakker, one of the members of the administration of the Zealand Co., was present to reply to the toast. Dr. Bakker, in replying, said that they were always glad to entrust the building of their boats to Fairfield, as the yard had a reputation everywhere for good work, and its ships classed high in all parts of the world. Referring to the Queen Regent of Holland, after whom the new ship was named, he said she was beloved by all the nation, and had in her charge the training of their young Queen, after whom the first vessel of the three had been named, he concluded by proposing "Success to the Fairfield Co." Mr. Barnwell replied, remarking that he hoped the acquisition of these new vessels by the Zealand Co. would make the service even more popular than it was. It could hardly fail to be popular, he said, when controlled by such men as Dr. Bakker and Mr. Van Woelderren. He proposed the health of Mrs. Sharer, who had performed the christening ceremony, to which Mr. Sharer replied.

**Solway.**—On July 10th Messrs. Barclay, Curle & Co., Limited, launched from their building yard, Whiteinch the

steel barge *Solway*, built to the order of Messrs. J. & J. Rae & Co., of Liverpool, and is intended for their general trade. The vessel will carry about 2,800 tons deadweight, and is specially designed for fast sailing, having large spread of canvas, all yards being constructed of steel, and is fitted with the best appliances for the rapid working of sails and cargo, including Hastie's patent halliard winches and patent brace winches. Her dimensions are 254 ft. by 39 ft. by 22 ft. 6 in., and will measure about 1,600 tons gross. On moving on the ways the naming ceremony was performed by Mrs. James Rae, Hawarden Avenue, Liverpool.

**Tug.**—On July 11th Messrs. John Cran & Co., Leith, launched a beautifully modelled steel screw tug to the order of the Manchester Ship Canal Co. Her leading dimensions are:—58 ft. on keel, 13 ft. beam, and 7 ft. 3 in. depth of hold. She is propelled by C. S. C. engines of 120 H.P. constructed by the builders. Messrs. Cran have another tug of similar size almost completed for the same owners.

**Inverlochty.**—On July 17th Messrs. Russell & Co., shipbuilders, Port-Glasgow, launched from their Kingston Yard a three-masted barque 1,800 tons net register, of 2,400 tons carrying capacity, and of the following dimensions:—Length, 238 ft.; breadth, 86½ ft.; and depth, 22 ft. The new vessel is named *Inverlochty*, and is to the order of Messrs. George Milne & Co., Aberdeen.

**Sardinia.**—On July 19th the steamer *Sardinia*, built by Messrs. Gourlay Bros. & Co., Dundee, for the continental trade of Messrs. James Currie & Co., Leith, was launched from the shipyard in Dundee. The dimensions of the vessel are as follows:—Length, 290 ft.; breadth, 32 ft.; and moulded depth, 17 ft. 4 ins. The vessel is classed 100 A1 at Lloyd's. Her gross tonnage is 1,100 tons.

#### LAUNCHES—IRISH.

**Victorian.**—On Saturday, July 6th, Messrs. Harland & Wolff launched from the northern end of the Queen's Island a large steel screw steamer built to the order of Messrs. Frederick Leyland & Co., Limited, of Liverpool, for their Liverpool and Boston trade. The vessel, which is the second longest cargo steamer afloat, is 512 ft. in length, and her tonnage is about 8,780. She will have four pole masts, schooner rigged, and be fitted with all the most approved appliances for the working of ship and cargo, as well as with a complete installation of electric light. Her machinery consists of a set of triple-expansion engines constructed by the builders. As she was leaving the ways the vessel was gracefully named the *Victorian* by Miss Teresa Cullen, the daughter of the vice-chairman of the company. The owners were represented by Mr. Cullen and Mr. Neville Evans, the superintending engineer.

Messrs. Harland & Wolff, Belfast, have at present under construction the following vessels:—One steamer, 560 ft. in length by 60 ft. beam, for the White Star Line; three steamers, 515 ft. long by 65 ft. beam, for Messrs. F. Leyland & Co.; and one 500 ft. by 54 ft. for the P. & O. Co., besides several other steamers ranging from 400 ft. to 500 ft. long.

**Pakling.**—There was launched from the shipbuilding yard of Messrs. Workman, Clark & Co., Limited, Belfast, on July 24th a large steel screw steamer named the *Pakling*. This is the first of three vessels now under construction, and is the third built for the China Mutual Steam Navigation Co., Limited, of London, and has been specially designed to suit the requirements of their trade. The dimensions are:—Length, 410 ft.; breadth, 48 ft.; depth, 30 ft.; with a gross tonnage of about 4,600. She has been built to class 100 A1 at Lloyd's, and with Beard of Trade passenger certificate. The upper and main decks are of steel, and in addition the upper is sheathed with teak. A cellular double bottom extends right fore and aft for water ballast, which can also be carried in the peaks, and in a deep tank in one of the after holds, also arranged for cargo purposes. The appliances for loading and discharging are arranged to the best advantage, two of the hatches being each worked by two steam winches and derricks, the other two having three winches and four derricks, supported from the masts and crane posts. In the fore-castle is placed the rooms for the petty officers, crew and firemen. On the bridge deck, in houses at each side of the casing, are the officers' quarters. The saloon is at the fore end of the deck in a steel deckhouse, also containing rooms for the captain and several staterooms handsomely panelled and uphol-

stered. A large poop extends for a distance of 60 ft. from aft. The *Pakling* will be rigged as a two-masted schooner, with telescopic masts to suit the Manchester Canal. The machinery has been constructed at the builders' engine works, and consists of triple-expansion engines of large power, with steam supplied from two large double-ended boilers, with forced draught on Howden's system. A large auxiliary boiler supplies steam for the deck machinery. A numerous company assembled to witness the launch, including W. A. Gulland Esq., managing director, China Mutual Steam Navigation Co., and Captain John Hogg, marine superintendent for the company.

#### TRIAL TRIPS.

**Ortoire.**—The twin-screw dredger *Ortoire*, constructed by Messrs. Wm. Simons & Co., Renfrew, to the order of the Crown Agents of the Colonies, has completed her trials on the Clyde with satisfactory results. The buckets have capacity to raise 300 tons of free soil per hour and of dredging the vessel's own flotation to a depth of 20 ft. under water level. After dredging operations were completed, the vessel proceeded to the Gareloch, when four runs were made over the measured distance with a result of fully one knot in excess of the speed contracted for was obtained. The *Ortoire* was constructed under the supervision of Messrs. Coode, Son & Matthews, London, and leaves in a few days for Trinidad.

**Sturgeon.**—On June 22nd H.M. torpedo-boat-catcher *Sturgeon*, built and engined by the Naval Armaments Co., Limited, Barrow-in-Furness, proceeded to the measured mile at Skelmorlie for the purpose of undergoing her official three hours' speed trials. These proved of the most satisfactory nature, alike to the Admiralty officials on board and to the representatives of the builders. The average of the six runs on the mile was 27.6 knots, and the mean speed attained in the three hours' steaming 27½ knots per hour. The *Sturgeon* is 196 ft. long by 19 ft. 6 in. beam, and 250 tons displacement. Her engines are of the usual triple-expansion type, and she is fitted with Mr. Blechynden's (the manager of the Naval Armaments Co.) patent boilers, which are compact, and arranged so that all tubes can easily be renewed. The Admiralty were represented on board by Messrs. Harding and Welsh; the Admiralty Dockyard by Mr. Hobbs; the Steam Reserve by Mr. Ramsey; and the Naval Armaments Co. by Messrs. Blechynden and Buchanan.

**Beechwood.**—On June 27th the Northwold Steam Fishing Co., Limited, of Grimsby, had the official trial of the new inshore steam fishing vessel *Beechwood*. This ship which was built by Messrs. Coochrane & Cooper, Grove Hill, Beverley, measures 92 ft. long by 20 ft. 6 in. breadth by 11 ft. depth of hold. Her machinery, supplied and fitted on board by Messrs. Ames & Smith, Hull, consists of triple-expansion engines, having cylinders 10 in., 16 in., and 25½ in. diameter, with a stroke of 20 in. Various tests were made of her steering and steaming qualities, and those gentlemen on board representing the owners expressed themselves as satisfied with their new purchase, a mean speed of over 10 knots being obtained.

**Carinthia.**—On June 28th the trial trip took place of the Cunard steamer *Carinthia*, which was launched from the yard of the London and Glasgow Engineering and Iron Shipbuilding Co., about the end of May. The party joined the steamer at Gourcock at 10 o'clock a.m., and after a run down the river and round Ailsa Craig, the vessel returned to Gourcock and landed the party. Everything worked well during the trial, the speed being 15½ knots.

**Caledonia.**—The twin-screw steamer *Caledonia*, constructed by Messrs. Bow, M'Lauchlan & Co., of Paisley, to the order of Mr. Thos. Cameron, of Portonachan Hotel, had lately a very satisfactory trial trip on Loch Awe. A party of ladies and gentlemen from Glasgow, Oban, Dalmally, &c., had a pleasurable run on board, and the steamer performed up to expectations. The *Caledonia* has a draught of about 4 ft.; length, 80 ft.; breadth, 14 ft. 6 in.; total cost, about £2,500. The fittings are elegant and comfortable.

**Fastnet.**—On Saturday, June 29th, the trial trip took place of the steamer *Fastnet*, which was recently launched by Messrs. W. B. Thompson & Co., Limited, Dundee, for the Clyde Shipping Company, Glasgow. The *Fastnet* is 1,160 tons register, and is a beautiful model of what a passenger

and cargo boat should be. In length she is 255 ft., in breadth 35 ft., and she has a hold 16 ft. 11 in. in depth. Constructed for the coasting trade—principally for passengers and cattle between Glasgow and the West of Ireland—she has been built to satisfy the requirements of the British Corporation, with which association she is registered. There are three holds, the bottom of the vessel, clear of machinery spaces, being constructed and divided into suitable compartments for water ballast. Handomely fitted up cabins are provided for between 40 and 50 first-class passengers under the after end of the poop deck. Special contrivances have been used to perfect the ventilation of the cattle spaces, and steam cranes and winches have been provided to render the handling of cargo easy and expeditious. Throughout the vessel is lighted by electricity. The engines, which were built at Messrs. Thompson & Co.'s Lillybank Works, are of the triple-expansion type, having cylinders of 23 in., 38 in., and 61 in., with 48 in. stroke. Steam is supplied from two steel boilers at 160 lbs. per square inch. A number of friends of the owners and builders were invited to the trial trip. At half-past ten o'clock the *Fastnet* steamed down the river. No test of speed was made, but on the trip the engines were found to work in a very satisfactory manner, and a good rate of speed was maintained. The vessel steamed as far as the Bell Rock, and then returned to Dundee. On the homeward sail those on board sat down to an excellent luncheon.

**Plymouth Belle.**—On June 29th the paddle-steamer *Plymouth Belle*, lately launched by Messrs. John Scott & Co. at Kinghorn, went on her official trial trip, when everything worked to the entire satisfaction of Mr. Dusting, of Plymouth, managing owner, and Mr. Walker, of London, the consulting engineer. The speed obtained was over 17 knots on a six hours' trial and on four consecutive runs on the measured mile, this being a knot over the guaranteed speed. The vessel has been very strongly constructed for a home trade passenger certificate, and is intended to run from Plymouth to the Channel Islands and the coast of France, and is certified to carry 660 passengers on these runs. The dimensions of the vessel are:—Length, 220 ft.; breadth 26 ft.; depth, 9 ft. 4 in.

**Fernfield.**—On Wednesday, July 3rd, the s.s. *Fernfield*, built by Messrs. Furness, Withy & Co., Limited, West Hartlepool, went out on her trial trip and had a very successful run. The speed obtained over a run of 18 miles was 11.96 knots. The vessel is a substantial type of a modern cargo boat, measuring over 340 ft. in length with a large measurement and deadweight capacity, and is built throughout of Siemens-Martin steel to the highest class at Lloyd's, and every care has been taken in designing the vessel to construct her as strong as possible for the heavy deadweight trade. The vessel is built on the web-frame system with cellular double bottom, all fore and aft and subdivided at intervals, the after peak being also available as a tank. The main and fore holds are divided by steel watertight bulkheads efficiently stiffened by an iron longitudinal division. The greater portion of the shell plating is in 24 ft. lengths and is efficiently backed up by strong sectional framing to the top of the vessel all fore and aft, the topside plating being extra thick to withstand the heavy Atlantic trade. The bottom plating is also thicker in way of the ballast tanks to allow of the vessel lying aground whilst loading. The whole of the weather decks, tank top, floor plates, etc., are also of extra thickness and the hatchways are of a size to take in the bulkiest cargo. Large steam winches, patent steam steering gear amidships, hand steering gear aft, steam windlass, large donkey boiler, and patent stockless anchors are fitted. The vessel is rigged as a pole-masted schooner, and to make her available for bridge and canal work the topmasts are fitted to telescope into the lower masts. The engines and boilers were fitted by Messrs. Blair & Co., Limited, of Stockton, who were represented on this occasion by Mr. Reed. The machinery worked very smoothly throughout the trial. The ship has been constructed under the careful supervision of Captain McFee on behalf of the owner, F. Woods, Esq., of London, who was on board and who expressed his satisfaction with the vessel at the conclusion of the trip. The following friends of the owner were present:—J. R. King, Esq., Reading; J. Edwards, Esq., London; W. Dunning, Esq., Rochdale; J. King, Esq., Manchester; and the builders were represented by H. Withy, Esq., J.P. The *Fernfield* is commanded by Captain Watson who served his apprenticeship with Mr. Woods in sailing vessels.

**Lady Margaret.**—On July 3rd the paddle-steamer *Lady Margaret*, lately completed by Messrs. Archibald M'Millan &

Son, Limited, Dumbarton, for Messrs. Edwards, Robertson & Co., Cardiff, went down the Firth on her trial trip. The vessel, the dimensions of which are 215 ft. by 25 ft. by 16 ft. 6 in., has been specially constructed for passenger service on the Bristol Channel. The promenade deck extends fore and aft, and underneath are the saloons for first and second class passengers. The dining saloons are fitted below the main deck, as is also the accommodation for officers and crew. The deck fittings are of teak, and the whole internal arrangements have been designed and finished for the requirements of a first-class passenger steamer. All modern improvements for the efficient working of the vessel in her special trade have been supplied, and include steam steering gear, steam windlass, steam warping capstans fore and aft, and a complete installation of electric light. The machinery, which consists of a set of compound surface-condensing engines, supplied with steam at 125 lbs. pressure from a multitubular boiler, has been constructed by Messrs. David Rowan & Son, Glasgow. The speed attained over the measured mile was fully half a knot in excess of that guaranteed. The construction of the steamer was superintended by Mr. R. Morton, of Messrs. Morton & Williamson, Bothwell Street, Glasgow.

**Monsoon.**—On July 4th the trial trip of the steam yacht *Monsoon* took place. Owner, Lieut. W. N. Diggle, R.N. Dimensions of yacht—length, 138 ft. 5 in.; breadth, 19 ft. 5 in.; depth, 11 ft. 1 in.; tonnage, yacht measurement, 235; tonnage, gross register, 171. Particulars of machinery—diameter of cylinders, 15½ in. and 30 in.; stroke, 28 in. Boiler—diameter, 10 ft.; length, 9 ft.; working pressure, 100 lbs. Total, H.S., 856; total, F.G., 38. Propeller—Number of blades, 4; diameter, 8 ft.; pitch, 12 ft. 6 in.; surface, 18 square feet. Draught—forward, 8 ft. 7½ in.; aft, 10 ft. 4½ in.; mean, 9 ft. 6½ in. Displacement, 280 tons. Weight on board: coal, 40 tons; water 6½ tons; ballast, 30 tons. Mean steam pressure, 96; vacuum, 25; revolutions 110; mean speed on 4 runs, 11.014. Mean I.H.P., 266.

**Nubia.**—The s.s. *Nubia*, 1,196 tons, recently launched by Messrs. Ramage & Ferguson, Limited, Leith, for Messrs. Jas. Currie & Co.'s coal trade between Grangemouth and Hamburg, has lately completed her trials on the Firth, when a mean speed of 12.03 knots was obtained on the measured mile with 1,400 tons deadweight on board.

**Rheno.**—On July 6th the new steam trawler *Rheno* went on her trial trip. The vessel, which has been built to the order of Mr. G. F. Sleight, Grimsby, by Messrs. Cochrane & Cooper, Grovehill, Beverley, is of the following dimensions:—89 ft. by 20 ft. by 10 ft. 8 in. depth of hold. The engines have been supplied by Messrs. C. D. Holmes & Co., Hull, and consist of 40 N.H.P. triple expansion. The vessel is fitted up with all the latest improvements for steam trawling, including Sturdy's patent centre and side bollards. After taking a large party of guests on board, the vessel put out to sea, a most satisfactory trial trip being run, entirely to the approval of the owners. The company included Mr. G. F. Sleight and Mr. Harry Sleight, the builders being represented by Mr. Cochrane, and the engineers by Mr. Smith. There were also present Messrs. Sturdy & Hutton, engineers and ship surveyors.

**Majestic.**—On July 9th the fine steel screw steamer *Majestic*, built to the order of Messrs. W. H. Cockerline & Co., Hull, by Messrs. Wm. Gray & Co., Limited, and engaged by the Central Marine Engine Works, went on her trial trip in Hartlepool Bay. We gave a full description of this vessel at her launch on the 8th June. The ship is 324 ft. in length, 44 ft. in breadth, and depth, 23 ft. 8 in. The engines are 28 in., 36½ in., 62 in. in diameter respectively, with a stroke of 39 in. The vessel having left the docks the compasses were adjusted in the Bay by Messrs. Berry, and after this a run along the coast beyond Saltburn and back was made at full speed, the engines running in a perfectly satisfactory manner and an ample supply of steam being maintained in the boilers. By the log the speed of ship on the hour's run was registered at 11½ knots. The company on board included the managing owners, Messrs. W. H. Cockerline, and T. D. Woodhead. There were also present Mrs. Cockerline, with the Misses Cockerline and Mr. Herbert Cockerline, Mrs. Woodhead, Mr. J. W. Penn, of Cardiff, Mr. G. H. Strong, M.I.N.A., of Hull (who has represented the owners during the construction of both hull and machinery), whilst the builders were represented by Capt. Murrell and Mr. Baines. At the conclusion of the run "Success to the *Majestic*" was proposed by Capt. Murrell, who called attention to the fact

that this is the third ship which Messrs. Gray have built for Messrs. Cockerline, and to the interesting fact that she is number 500 of Messrs. Gray's build, and also to the happy coincidence that the 500th ship should be so appropriately named. Mr. Cockerline replied on behalf of the owners, and the usual good wishes for the prosperity of the builders' firm were duly honoured. The vessel proceeded to Hull with the above-named party on board, where she will load for Cronstadt.

**Eidsvold.**—On July 10th the s.s. *Eidsvold*, a fine steamer, left Messrs. Ropner & Son's shipbuilding yard, Stockton-on-Tees, on her trial trip from the Tees to the Tyne. The steamer made a very satisfactory run, the machinery having worked very smoothly and without a hitch. The vessel has been built to the order of a Norwegian firm, her builders having before completed several steamers for the same owners, all of which have given the greatest satisfaction. The dimensions of the vessel are:—Length between perpendiculars, 330 ft.; breadth, extreme, 45 ft.; depth, moulded, 29 ft. 6 in. She is built to the spar-deck rule, and has poop, bridge, and topgallant forecabin. The saloon and cabins for captain and officers are arranged in the fore part of the bridge, whilst the engineers are provided for in the after part of same, the crew being placed in the forecabin as usual. She has double bottom on the cellular principle for water ballast, and has been designed to carry a deadweight cargo of 5,550 tons. She is fitted with all the most recent appliances for the expeditious and economical loading and unloading of cargoes, has direct steam windlass, steam steering gear amidships, with powerful screw gear aft, four large steam winches, double derricks, large multi-tubular D boiler, stockless anchors, &c. The poop is arranged to carry cargo, and the masts are on the telescope principle, enabling the steamer to pass under bridges, and consequently fitting her for canal work. She is fitted with a set of triple-expansion engines from the well-known works of Messrs. Blair & Co., which will develop 1,850 effective H.P. After the compasses were adjusted, the steamer made for the Tyne, having obtained a speed of 10 knots, which was considered highly satisfactory.

**Tabasco.**—On July 10th the new steamer *Tabasco*, built by Mr. James Laing for the Neptune Steam Navigation Co., of Sunderland, took her trial trip from the Wear. A numerous company was on board, including the managers, Mr. W. Pinkney and Captain T. W. Pinkney, as well as several directors of the company. The vessel had an excellent run, her engines, which were supplied by Messrs. Clark & Co., Limited, developing a speed of 12½ knots. The *Tabasco* afterwards proceeded to Hamburg to load for the United States of America.

**Cadiz.**—On July 11th the trial trip took place of the s.s. *Cadiz*, sister ship to the s.s. *Barcelona*, and the second of a new line of steamers to be run by Messrs. Pinillos Izquierdo & Co., Cadiz, and to give a monthly service between Glasgow, Liverpool, the principal Spanish ports and the Philippine Islands. She has been constructed by Messrs. Charles Connell & Co., Whiteinch, to pass Lloyd's highest class, and is of the following dimensions:—Length, 390 ft.; breadth, 46 ft.; depth, 31½ ft.; load displacement, 8,700 tons. Her machinery, consisting of a powerful set of triple-expansion engines, having cylinders 30 in., 48 in., 78 in. by 54 in. stroke, two double-ended boilers and one large single-ended boiler, with large donkey boiler, eight steam winches, Weir's feed pumps, heater, and evaporator, and all the latest improvements had been supplied by Messrs. Dunsmuir & Jackson, Govan. The vessel throughout is fitted up in a first-class style, with electric light and all the latest appliances for the efficient handling of cargo. The trial was most satisfactory in every respect, the speed attained being 14½ knots, partly loaded.

**Handy.**—On July 12th H.M.S. *Handy*, one of the three torpedo-boat destroyers which the Fairfield Co. have lately built for the British Government, completed her preliminary trials on the Clyde. The weather was far from favourable to fast steaming. For the greatest part of the day there was a stiff breeze from the north-west, and rather more broken water than was desirable. But even with these drawbacks the little boat made a performance very creditable, even to Fairfield, the mean speed of her half dozen runs over the measured mile at Skelmorlie coming out at something like 27½ knots. Everything worked very smoothly, the machinery even at the higher speed-running as people have learned to expect

of everything Fairfield turns out. The credit of the performance is, of course, largely Mr. Laing's, for with craft of this type the problem is almost solely an engineering one. In solving it the head of the engine department has not made any startling innovations, the engines being of the ordinary triple-expansion type and of about 4,600 I.H.P., and the boilers a slight modification of the well-known Thornycroft boiler, and the wisdom of in this way working along lines familiar by long experience was proved by the comparative ease with which the guaranteed speed was exceeded. In the evening the vessel returned to Fairfield, and with her sister ship, the *Hart*—whose preliminary performance, by the way, was almost identical—will leave shortly for the South Coast to go through her official trials in Stokes Bay. Amongst those on board were—Mr. W. J. Harding, Mr. C. J. Harding, Mr. King, and Mr. Whitford, representing the Admiralty; Mr. George Brown, of Messrs. Thornycroft & Co.; Mr. Laing and Mr. Sharer, of the Fairfield Co.; Mr. Harman, and Mr. Arthur Renton.

**Middleton.**—On Thursday, July 18th, the handsome screw steamer *Middleton* had her trial trip. The vessel has been built by Messrs. Wm. Gray & Co., Limited, of West Hartlepool, for the Middleton Steamship Co., Limited, of Hull (Messrs. H. Samman & Co., managers). She is 314 ft. in length, 44 ft. in breadth, and 23 ft. 2 in. deep, and she takes Lloyd's highest class. The deck erections consist of a half poop, bridge, and forecabin, and the rig is fore and aft schooner with telescopic top masts. Very tasteful cabin accommodation has been provided under the poop, consisting of saloon, state-room, captain's and officers' rooms. The engineers' quarters are amidships, and the crew's berths forward. The sides of the vessel are supported by strong web frames, taking the place of hold beams as far as possible, and leaving a clear hold for storing bulky goods. A cellular double bottom is fitted, and also an after peak tank for water ballast, whilst the steam windlass, steam steering gear amidships, screw gear aft, steam winches, patent donkey boiler, and the whole of the outfit are of the most approved description. The machinery has been supplied by the Central Marine Engine Works of Wm. Gray & Co., the engines being of the triple-expansion type, with cylinders 23 in., 36½ in., and 62 in. in diameter, and a piston stroke of 39 in., and steam is supplied by two large boilers, working at 160 lbs. pressure. Leaving the Tyne (where the vessel had gone to load) the *Middleton* proceeded to the measured mile, where a very exhaustive trial was made, a main speed of 9½ knots being recorded, with other 4,000 tons on board, the machinery running with perfect smoothness, and without the slightest trouble arising, and the boilers keeping up an ample supply of steam. Amongst those present were: Mr. Samman (managing owner), Mr. Clark, of Hull, Mr. Frank Lambert, of Beverley, Mr. Danbrumenel, of London, Mr. Garbutt & Son, of West Hartlepool, and Mr. Walter Sage, of Hull, under whose superintendence the vessel and her machinery have been constructed. Immediately on the conclusion of the trial the vessel proceeded on her voyage.

**Amana.**—On July 25th the s.s. *Amana*, built by Messrs. Palmer's Shipbuilding and Iron Co., Limited, to the order of Mr. James Mark Wood, of Liverpool, was taken to sea for her official steam trial, her dimensions being as follows, viz.:—Length, between perpendiculars, 350 ft.; beam, moulded, 45 ft.; depth, moulded, 27 ft. 6 in. The vessel has been built under special survey to class 100 A in Lloyd's Register, and is of the spar deck type, having a poop, bridge and forecabin. Two complete steel decks are laid, extending all fore and aft. The poop is fitted for cargo, the officers and engineers being berthed in the bridge, and the crew in the forecabin. Water ballast is provided for aft in a cellular bottom and in a deep hold tank amidships. All the necessary requirements to fit the vessel for general and grain cargoes are complied with, and all the most modern improvements for the safe handling of the vessel and rapid loading and discharging of cargo are supplied and fitted throughout. The vessel is designed to load a deadweight of about 5,200 tons on Lloyd's summer draught. The engines, which have also been built by the Palmer Co., are of triple-expansion type, with cylinders 24 in., 40 in., 64 in., and 42 in. stroke, two steel boilers working at a pressure of 180 lbs. per square inch. During the trial trip the engines worked for a considerable time at 79 revolutions per minute in a highly satisfactory manner, and a mean speed of 11·6 knots per hour was attained on the measured mile, after which the vessel proceeded to Newport to load.

**Ardandearg.**—On July 25th the steamer *Ardandearg* proceeded down the Belfast Lough for her trial trip. She has been built to the order of Messrs. Clark & Service, Glasgow, for their Ardan Line of steamers, and is the fourth of that fleet constructed by Messrs. Workman, Clark & Co., Limited. The principal dimensions are:—Length, 335 ft.; breadth, 43 ft. 6 in.; depth, moulded, 28 ft. 11 in., with a gross tonnage of 3,217, and deadweight capacity of 5,800 tons. She has been built under special survey and to the requirements of the British Corporation and Lloyd's 100 A1 class. The spar and main decks are of steel, and the deck erections consist of poop, bridge, and topgallant forecastle. A cellular double bottom is carried fore and aft for water ballast, and also in after peak. The holds, four in number, are fully equipped, with winches and derricks, having two at each of the larger hatches. On the bridge deck is placed the accommodation for the captain and officers, in a steel deck house at the fore end, and the engineers are housed alongside the engine casing. The roof of the saloon house forms a deck on which are placed the chart and pilot houses with the flying bridge extending out to the ship's side. The crew and petty officers are placed under the forecastle deck. All the deck machinery for navigating the ship, etc., is of the latest design and approved type. The *Ardandearg* is rigged as a two-masted schooner, with masts arranged on the telescopic principle to suit the Manchester Canal. Machinery has been constructed at the builders' engine works, consisting of triple-expansion engines and cylinders, 22 in., 36 in., 60 in., and stroke 42 in. Steam is supplied from two large steam boilers at a working pressure of 180 lbs. These boilers are fitted with Howden's system of forced draught. A large donkey boiler supplies steam to the winches and auxiliary machinery. After running the measured mile, on which an average speed of 12.5 knots was attained, the *Ardandearg* cruised about for some time, and will proceed to Dieppe to load for her first voyage.

## Reviews.

*The Merchant Shipping Act, 1894: A Supplement to Kay's "Law relating to Shipmasters and Seamen."* With notes by the Hon. John W. Mansfield and G. W. Duncan, Esq., Barrister-at-Law. London: Stevens & Haynes. 1895.

WHEN a few months ago the second edition of Mr. Kay's work went to press, it looked as though the long-talked-of Merchant Shipping Consolidation Act might be indefinitely postponed, and the present editors seemed well advised in delaying no longer the publication of the work to which they had devoted so much care and labour. Hardly was the book through the press when the Bill became law, and their work became, to a certain extent, out of date. We say to a certain extent, because the writer of the present notice is constantly at work upon the Merchant Shipping Act, and Messrs. Duncan and Mansfield's book is to him ever proving its value, and he is able to attest now from practical experience to that value which he merely anticipated in his original notice. The usefulness of the original volume is not impaired by the legislative change, but for certain purposes reference to it will be found less easy. The authors are, however, determined that they will keep their work up to date, and render access to their stores of legal knowledge accessible to the most indolent. Accordingly, they have added a supplement to the original volume, which at a moderate price brings us not only right up to the times but even slightly in advance of them, for we are given first the whole of the new Act with rules and schedules. This with marginal notes, which not only refer us to the original Acts, but also to the section in Kay's book where the point under legislature is referred to, and where the case law upon it can be at once discovered.

Secondly, we are afforded a supplement containing the Proposed Regulations for the Prevention of Collision at Sea, which should have come into force in March of the present year, with some excellent notes thereupon. These likewise have marginal references to Kay. Thirdly, the volume contains a reprint of the index to the original volume, with additions which must have cost the compilers great labour. Under each reference we now have two numbers—one in light type leading us to the proper section in Kay, the other in heavier type referring us to that in the Merchant Shipping Consolidation Act. The whole is clear and useful, and the supplemental cannot fail to be useful alike to the lawyer and the practical man, whether the latter be afloat or ashore. There is one suggestion we would make to the authors. That

s that they would see their way in the next edition of this work, to give their references no longer by sections, but by pages. We can reckon by pages so easily, because they are all the same size, whereas sections vary in length from one line to many pages, and much time may consequently be lost. This is a fault common to most law books, but it is one whose absence would be keenly appreciated.

*The Steam Jacket.* By William Fletcher. London: Whittaker & Co. 1895.

THIS is a second and revised edition of a book which is calculated to be useful to those who build, use, or manage the steam engine. The author has devoted much time and labour to the elucidation of his subject. He shows how greatly a proper steam jacket adds to the economical working of the steam engine. Yet he also shows how little its functions are understood and how difficult is the proper application of them to every-day requirements. Many steam jackets are useless, or even worse than useless, owing to the radical mistakes contained in their designs and to the stupidity and carelessness of the persons who are placed in charge of machinery. The latter difficulty is a comparatively simple one to combat because it can be met by making the action of the steam jacket, to a great extent, independent of the control of the engine attendant.

The amount of increase in the efficiency of the steam engine is said to be very considerable. The value of the appliance was recognised in early days by Watt, and, though he for a time lost faith in it, he afterwards returned to the belief in its efficiency. Mr. Scott Russell stated, on the authority of Trevithick, that "there was a 40 per cent. increase in the duty of Watt's engines when worked expansively, from putting a steam jacket on the cylinders." A letter from Mr. Pinckbeck to an engineering newspaper is also quoted, in which an instance is given of an engine, which, when jacketed, worked on a consumption of 14 cwt. a day. When the jacket was removed for repairs the consumption rose to 20 cwt., and fell back to its original amount when the steam was re-admitted to the jacket. This economy is about the same as that mentioned by Trevithick. These two instances would alone appear convincing, but Mr. Fletcher gives us the results of numerous experiments with various classes and types of engine, some of a very elaborate kind, and from these he deduces the amount of economy to be derived from its use.

Mr. Fletcher gives several points necessary to the efficiency of the steam jacket. Some of them are sufficiently obvious when we remember that the object of the appliance is to keep the temperature of the cylinder at as high a point as the steam supply, and that condensation in the jacket makes it worse than useless. Having appreciated these points it is not difficult to accept his propositions that an "efficient steam jacket must encircle the cylinder from end to end," or that the exhaust chamber should be made as small as possible to avoid lowering the jacket temperature to that of the exhaust. From the weakness of human nature we see the advantage of the insistence that the steam jacket should be at all times open to the boiler and not be under the control of the stop valve. For thus the cylinder becomes heated gradually as steam is raised, and the engine-driver has no power to interfere with its functions. Thorough circulation and drainage are evidently important points. It is also evident that what applies to the walls of the cylinder is equally right for the covers, and that they therefore should be jacketed also, whilst the piston itself may be advantageously kept hot. Many of the illustrations given in this connection are obviously connected with portable and stationary engines. But the principles are the same for all classes of engine, though the application of the principles may be different. Mr. Fletcher tells of a large marine engine where the pistons were provided with balancing cylinders fixed to the bottom of covers of each cylinder. The balancing cylinders had hollow piston rods, through which steam was admitted to the interiors of the main pistons, whilst the effective pressure of steam on the under sides of the balancing pistons was increased by the upper ends of the balancing cylinders being placed in communication with the condensers.

Generally we can recommend the book to our readers, for it is a careful *resumé* of the author's extensive and laborious researches into a very special subject. In these days of excessive competition, no means of effecting economy, or getting increased duty out of machinery, can be neglected, and those who are engaged in the designing and management of steam engines will be very likely to learn much that is commercially useful from a study of this volume.



*Hydraulic Motors, Turbines, and Pressure Engines.* By G. R. Bodmer. London: Whittaker & Co. 1895.

THIS is a second edition, much enlarged and brought down to date. It is a very useful volume in a very useful series (the Specialist's), dealing, as it does, with the application of one of the most widely-distributed and most cheaply harnessed of all the forces of nature. As the writer justly points out, it is not only one of the most universal, but one of the most economical sources of energy. For when the force has been expended the water still remains, and herein there lies a great difference between water power and steam power, for in the latter case the coal which raises the steam is, as far as we as yet have any knowledge of the subject, irretrievably lost. The action, in fact, is in most applications of so-called water power not water power at all, but the application of the power of gravitation. These considerations lead to the discussion of the laws which govern, and the mathematical formulæ which express, the action of fluids flowing in closed channels. Having then considered the flow of water upon curved vanes, we are in a position to examine the different types of turbines, and to divide them into classes. Each class is then considered as to its design and theory, whilst the practical working is by no means lost sight of. Descriptions of the installations for the employment of water power at Niagara and at Schaffhausen, on the Rhine, are given with considerable detail, whilst throughout the volume tables, plates, and diagrams are thickly interspersed. The perusal of this book may suggest to many engineers who are in charge of stationary engines the consideration of the question as to whether it may not be possible to utilise some neighbouring water supply, or at least where such supplies are already harnessed, to very greatly improve the methods by which they are worked. In brief, we may say that the present volume is a very good specimen of the exhaustive treatment so characteristic of the Specialist Series.

## Correspondence.

[It must be understood that, in giving insertion to communications under this heading, we do not in any way pledge ourselves to the opinions preferred therein. We will with pleasure insert any letters likely to benefit our readers either from their intrinsic value or as being calculated to promote such discussion as will elicit facts valuable from their being the result of practical experience.—ED. M. E.]

### WORKSHOP FURNACES FOR GAS.

To the Editor of THE MARINE ENGINEER.

With reference to your note re workshop furnaces for gas, the time given by you is the slowest with a 6 in. or 8 in. fan, or hand blower, starting all cold. There is practically hardly any limit to the speed and power, and with a small Root's blower a blinding white, or blue-white heat, can be obtained if required, in 10 or 15 minutes, starting all cold. We could melt a 1 cwt. block of cast iron before the 2 in. thick fire-clay casing had time to get warmed through; but of course excessive speeds like this are rarely desirable, they can be obtained if wanted, which is not the case with any furnace in which solid fuel is used.

Yours truly,

Warrington, FLETCHER, RUSSELL & CO., LIMITED.  
July 12th, 1895.

### BOARD OF TRADE EXAMINATIONS.

NOTE.—1C denotes First Class; 2C, Second Class.

June 22nd, 1895.

Bell, F. .... 2C Aberdeen  
Berkeley, F. .... 1C London  
Boyd, R. .... 1C Glasgow  
Clarence, F. L. .... 2C N Shields  
Cowper, W. P. .... 2C Aberdeen  
Darke, C. H. .... 2C Sundland  
Elder, James .. 2C ..  
Elridge, Ernest .. 1C Hull  
Henderson, J. S. 1C Aberdeen  
Kelly, A. H. .... 2C London  
Lancaster, F. T. 2C ..  
Lewis, W. R. .... 1C Cardiff  
Marshall, F. .... 2C Glasgow

Marshall, W. G. 2C Glasgow  
Mason, Wm. C. 1C Liverpool  
McArthur, W. C. 2C Glasgow  
McKinley, John 2C Liverpool  
McNaught, W. B. 1C Glasgow  
Morgan, Wm. .... 1C Cardiff  
Moussouris, G. .... 2C ..  
Miller, J. .... 2C Glasgow  
Newton, Robert 2C London  
Owens, John .. 1C Cardiff  
Page, P. P. .... 2C London  
Quane, Wm. .... 1C Cardiff  
Robertson, Jas. .... 2C Glasgow  
Robertson, J. .... 1C Aberdeen

Robinson, J. R. 1C Cardiff  
Robson, F. Geo. 2C Liverpool  
Shearer, Robert 2C ..  
Simpson, John .. 1C Glasgow  
Stephen, A. R. .... 1C Aberdeen  
Toulmin, A. H. 1C Liverpool  
Tubby, C. H. .... 2C Hull  
Vick, Alfred .... 2C Glasgow  
West, H. B. .... 1C ..  
White, Wm. .... 1C Hull

June 29th, 1895.

Addie, Thos. M. 2C Liverpool  
Aitchison, H. G. 1C ..  
Berryman, G. .... 2C Falmouth  
Brignone, Jose .. 2C Liverpool  
Brown, G. R. .... 2C N Shields  
Brown, George .. 2C London  
Burnett, J. E. .... 1C N Shields  
Crighton, John .. 2C Liverpool  
Ellis, R. M. .... 2C London  
Gollan, Donald .. 2C Liverpool  
Halpin, R. J. A. 2C London  
Henahaw, John .. 2C Liverpool  
Hunstone, T. H. 2C N Shields  
Mather, R. .... 2C S'th'pton  
Mell, L. P. .... 2C London  
Merrifield, H. .... 2C Falmouth  
Owen, Hugh .... 1C Liverpool  
Palmer, B. J. .... 2C London  
Paynter, R. H. .... 2C ..  
Robson, M. A. .... 1C N Shields  
Stone, J. T. .... 1C London  
Williamson, T. .... 1C ..  
Wray, J. C. .... 2C N Shields  
Young, J. R. .... 2C ..

July 6th, 1895.

Allan, W. McC. 1C Glasgow  
Boothroyal, B. .... 2C Liverpool  
Brunton, Jno. L. 1C ..  
Cameron, H. O. 2C Cardiff  
Cameron, Jno. S. 2C Liverpool  
Christie, David .. 1C ..  
Chumley, T. .... 1C London  
Cookburn, J. W. 2C Liverpool  
Collier, F. J. .... 2C London  
Collins, J. S. .... 2C Cardiff  
Colville, A. .... 1C Glasgow  
Cunning, J. S. 1C ..  
Dempster, R. .... 1C ..  
Denny, J. .... 1C ..  
Dodds, Wm. .... 1C ..  
Downie, Robert .. 2C S Shields  
Flawith, George 1C ..  
Glennie, G. S. .... 2C London  
Heppel, Thomas 2C S Shields  
Hogg, Hubert .. 2C London  
Johnson, H. J. .... 1C Cardiff  
Johnston, Thos. 2C Glasgow  
Lang, John R. .... 2C Liverpool  
Macdonald, T. .... 2C Glasgow  
Malmberg, Chas. 1C Liverpool  
Moffat, Jas. P. .... 2C ..  
Muir, John .... 2C Glasgow  
Mugrave, Evers 2C London  
Newson, A. T. .... 2C S Shields  
Platon, E. J. .... 2C Cardiff  
Pollock, John R. 2C Liverpool  
Rait, John .... 1C Glasgow  
Reynolds, F. H. 2C London  
Richardson, T. 2C S Shields  
Scott, A. W. .... 2C ..  
Scott, W. A. .... 2C ..  
Shields, A. B. .... 2C London  
Smith, A. B. .... 2C S Shields  
Stoker, H. R. .... 2C Cardiff  
Tremain, J. P. 1C Hull  
Urwin, W. .... 2C S Shields  
Walker, Harry .. 2C Hull  
Wallace, L. .... 2C Liverpool

West, Samuel .. 1C Liverpool  
Wight, H. D. .... 1C S Shields  
Woodsworth, A. 1C Liverpool

July 13th, 1895.

Allan, Arthur .... 1C London  
Anderson, J. C. 2C ..  
Batts, H. J. .... 2C Cardiff  
Bird, S. A. .... 2C ..  
Blake, A. J. .... 2C London  
Brown, F. V. .... 2C Liverpool  
Buchanan, G. .... 1C Greenock  
Campbell, J. .... 1C Liverpool  
Clark, Alex. .... 2C London  
Clark, Robert .. 1C Leith  
Comar, W. H. .... 1C N Shields  
Craven, R. P. .... 2C Liverpool  
Dawson, T. B. 2C Dublin  
Donald, W. C. .... 2C London  
Edwards, J. C. 2C Liverpool  
Findlay, T. C. 2C Greenock  
Hibbert, R. .... 2C N Shields  
Hyde, A. C. .... 2C Liverpool  
Jones, C. W. .... 2C Cardiff  
Jones, E. H. .... 1C London  
Keeling, J. W. 1C Dublin  
Leask, R. L. .... 2C Leith  
Lewis, James .. 1C London  
Mangham, J. R. 2C Liverpool  
Martin, J. .... 1C Leith  
McHutchison, J. 2C London  
Miller, F. G. .... 1C Dublin  
Morgan, S. P. .... 2C Cardiff  
Murray, Alex. J. 2C Liverpool  
Roberts, R. S. .... 1C Cardiff  
Solomon, D. K. 1C ..  
Stratton, T. .... 1C Leith  
Sullivan, A. P. .... 2C Cardiff  
Swann, G. T. .... 1C Greenock  
Wells, T. J. .... 2C Plymouth  
Williams, H. B. 2C ..

July 20th, 1895.

Anderson, John 1C Glasgow  
Bell, James .... 1C Liverpool  
Bishop, W. A. .... 2C N Shields  
Bladen, J. C. .... 2C Glasgow  
Coates, J. A. .... 2C W.H'pool  
Colledge, W. A. 2C ..  
Conner, Joseph 2C ..  
Cooper, G. H. .... 1C ..  
Daker, W. .... 2C ..  
Drake, Francis .. 2C London  
Flockhart, D. .... 1C Dundee  
Gaston, J. .... 1C Glasgow  
Hodson, Henry 2C Liverpool  
Humble, R. G. 2C W.H'pool  
Laing, Lawrence 2C Glasgow  
Lancaster, Thos. 1C W.H'pool  
Lawson, Peter 2C Liverpool  
Lee, Alfred .... 2C W.H'pool  
Lightfoot, J. A. 1C Liverpool  
McKechnie, J. G. 1C Glasgow  
Methven, Robt. 1C Dundee  
Methven, W. .... 1C Liverpool  
Noble, G. H. .... 2C W.H'pool  
Pickens, Thomas 2C ..  
Poole, W. J. .... 1C ..  
Purton, Ernest 1C Bristol  
Purvis, James .... 1C London  
Ripley, Alfred .. 1C W.H'pool  
Roxburgh, W. L. 1C Glasgow  
Ruston, J. A. E. 1C W.H'pool  
Scott, W. .... 1C Liverpool  
Stericker, John 2C London  
Tenton, P. R. .... 2C Glasgow  
Thomas, F. W. 1C London  
Tyler, Richard 2C Liverpool  
Watson, Andrew 1C ..  
Wilson, Robert 1C Glasgow  
Wilson, Thos. S. 2C W.H'pool

# The Marine Engineer.

LONDON, SEPTEMBER 1, 1895.

WHEN the authorities of the Post Office entered into the contract with the Cunard and White Star Lines for the conveyance of mails at bi-weekly intervals to New York, it was considered by all disinterested persons who were qualified to form an opinion on the subject, that the Government had been exceptionally fortunate in the terms which it made. The contract was not an exclusive one. The Post Office undertaking merely to send the general mails by the contract boats and having the power to send specially addressed letters by private steamers and by foreign mail liners. The contractors too were to receive no fixed subsidy at all. They were to be paid at a certain rate per pound carried for postal matter and the non-contract ships were to receive almost the same rate for the correspondence they carried. Thus the contractors received little more than outsiders, save the balance of non-specially directed letters, and gave a considerable *quid* for this apparently small *quo*. For they undertook to despatch their steamers at proper intervals all the year round, whatever might be the state of the freight or passenger market, and they also undertook to employ their best ships continuously in the service, save during the time necessarily occupied in the overhaul of the mail steamers in their turn. Some years have now elapsed, and during that time we have seen vessels unequalled for speed and regularity added to the fleets of these mail lines, whilst the safety and punctual despatch of the mail boats has been such as no other two Atlantic companies could hope or pretend to attain. Yet, for some reason, interested parties are raising an agitation in favour of an alteration in the contract. It is not altogether difficult to see why the agitation is started. Since the contract was entered into the United States have inaugurated a Line of American Mail steamers which are heavily—and we venture to think wisely—subsidised by the American Government. It is only natural that those interested in the American Line—and all patriotic Americans wish well to the new development—should desire that the American Line should carry the Royal Mails as well as those of the Great Republic. They lose sight of the fact that a specially addressed British Mail is already given to these steamers, and they wish that our Post Office should treat their steamers on equal terms with our own. To many persons this desire will seem unreasonable. Not because there is any inherent vice in a system of free mails taken

alone, but because of the fact that Atlantic Mail steamers are now nearly all subsidised as auxiliary armed cruisers for war purposes, and retained as such by their respective Governments. It is absurd for the nation to pay money, which might go to the encouragement of a national line of defence, to ships which cannot aid us in time of war, and which may actually be employed against us. This objection is fatal to any scheme for putting foreign ships on an equality with British, and the objection will continue good till it be conclusively proved that mail steamers are valueless for war purposes, whether as cruisers, transports, or despatch boats. That is to say—the objection must be permanent. This fact must be appreciated by all business men. The Americans, however, are not without hope that they may cause an agitation which will attain their ends. They are pursuing it in ways which are peculiar and characteristic. Some of them have got control of the new correspondent of the *Times*, a gentleman who dates his telegrams from New York. He opened the attack by finding fault with the delay to the *Aurania's* mail, when she had in fact had a derangement of machinery at sea. Then he continued it by jumbling up the sailings of North German Lloyd boats leaving Southampton on Wednesday (with a mail made up to Tuesday evening in London), with those of the White Star steamers which carry a mail of twenty-four hours later date. Ignoring this difference in time of departure, he pointed out cases where the German Mail got out first and made that a grievance. Suppose all he had said had been accurate, and the German boat had not had the day's start, where would have been the injustice to the customer of the Post Office? The sender of a letter could have it despatched by the German boat, or by a sailing ship, if he would only write the name on the envelope. We will not waste our time, or trespass on the reader's patience by examining all the cases of supposed injustice cabled over by the *Times* correspondent. They have been exposed and corrected in the columns of the *Times* itself. We will also leave to our readers' judgment the view he will take of the correspondent's conduct in making use of his position for the purpose of conducting an agitation of the character to which we allude. We merely insist on the aspect of the question in regard to Imperial Defence, and to the regularity of correspondence. For there is no doubt that if it were to be what is called free trade in mails, there would be no mails at all crossing the Atlantic during several months of the year.

Our friends at Glasgow must have found themselves very busy over the turn of last month by the presence in and about Glasgow of the Institution of Mechanical Engineers, who have made that centre of industry the

locality of their summer meeting. Although engineering establishments of all kinds were made the object of visits by various parties of the members of the Institution, it was not likely that such important establishments as those of the Clydebank Shipyard and Engineering Works, the shipbuilding works of Messrs. Wm. Denny & Brothers—who, we have just heard, have to deplore the loss of their chief, Dr. Peter Denny—and the engine works of Messrs. Denny & Co., were not likely to be omitted. In the Clydebank Shipyard H.M. battleship *Jupiter*, which is at present under construction there, was much admired, the special tools for frame bending and shearing channel bars attracting much attention. Another vessel, the *Terrible*, has also been on the stocks at this yard, and in the construction of this ship and the *Jupiter* the firm have made use of circular and band saws for cutting heavy forgings, plates, channel or angle bars. The band saw was found exceptionally useful for irregular cuts as distinguished from plain cross cuts. The modern plant of wood-working machines, by both British and American makers, were admired as a most perfect plant of its kind, and the heavy log ripping, and circular cross-cut saws and band saws were not a whit behind in perfection. In the engineering works the heavy plate planing machines and those for cutting circular and oval manholes were worthy of the attention they received, and the new plant for the making of water-tube boilers, lately laid down by Messrs. Thompson, naturally attracted great interest. Messrs. Thompson are chiefly confining their attention at present to the manufacture of Belleville boilers, which are being fitted on board the *Terrible*, and have been the subject of so much heated discussion in Parliament. A large party of about sixty members of the Institution thoroughly inspected by sub-division the Leven Shipyard and the Engine Works, both sections eventually meeting again for the pleasant duty of complimenting their hosts over wine and cakes. The visitors found a large variety of steamers on the stocks at the Leven Yard from 5,500 tons downwards, and the 100-ton sheerlegs in proximity to the firm's large wet dock, was an object of much interest. In the engineering works the boilers and engines for the ships just seen in the course of construction in the yard were found to be progressing rapidly. The Denny family, besides controlling the shipyard and engineering and boiler works, have a directing interest in the Dennystown Forge, producing the largest iron and steel forgings for ships and engines, and in the foundry business of Hardie & Gordon making steel ingots and castings by the Siemens-Martin process. It will be seen, therefore, that they thus form a close ring in the neighbourhood of Dumbarton for almost all classes of

manufactured material for ship, engine and boiler construction.

WATER-TUBE boilers are making good records as to economy of evaporation per pound of fuel burnt, and as to amount of water evaporated per hour per square foot of heating surface. In this way these boilers are proving their capacity as express steamers far in advance of the older form of marine boilers, when relative weights and space occupied are compared. From some elaborate tests of a well-designed tubulous boiler we see that with a forced draught of 2 inches the evaporation of water per pound of coal amounted to 9.45 lbs. from 52 deg. F. of feed-water, and the water evaporated per hour per square foot of heating surface was 6 lbs., a high boiler pressure of 240 lbs. per square inch being easily maintained. This is an excellent record, and if such boilers will only prove satisfactorily trustworthy and enduring under continued use, there is little doubt that they will become favourites and be largely adopted in the Marine of this country. Without doubt the many experienced and ingenious minds that are at present devoting themselves to this comparatively new form of boiler will gradually tend to produce improvements in the structure and fitting of the tubes and steam communications that will render them more enduring under constant use, and of easy access for repair and renewal to a greater degree than their detractors now anticipate, and we were interested in noting lately a most ingenious method, novel to us, of making the tube joints in the tube plates of such a water-tube boiler. The ends of the tubes were screwed externally with a very fine thread, the ends being thickened so that the screw threads did not reduce the strength of the tube. A gland screwed internally to fit the external tube threads of fine pitch, and also screwed externally with a thread of coarser pitch, is first fitted on to the tubes with the end of the tube projecting. The gland is then screwed into the tube plate, and, by reason of the difference of the pitches of the external and internal threads of the gland, thrusts the end of the tube against a shoulder in the recess of the tube plate, making a powerful steam-tight joint thereon by the action of the differential thread, and giving a simple and easy method of release for renewal. Of course the tubes under these circumstances are not straight but bent, so that the joints at either end are nearly at right angles to one another, so that the tubes will spring to the longitudinal draw to make a joint, and the joints are now affected by expansion or contraction. We think such a boiler "will go far."

**H.M. FIRST-CLASS CRUISER "POWERFUL."**

IN this number we give two page illustrations of H.M.S. *Powerful*. She was built at Barrow by the Naval Construction and Armaments Co., and launched latter end of last July. Her length is 538 ft. over all; 71 ft. beam; and a draught of about 27 ft., with a displacement of 14,200 tons. She is constructed throughout of steel, and has an armoured deck of the maximum thickness of 4 in., the conning tower, casemates, and barbettes being protected by 6 in. armour.

Her armament will consist of two 9.2 in. guns in barbettes, one forward, the other aft, with revolving steel hoods, twelve 6 in. quick-firing guns; sixteen 12-pounders, and twelve 3-pounder quick-firing guns; also nine machine guns in tops, &c., and two light or boat guns. The armour is all of Harveyised steel, supplied by Messrs. John Brown & Co., Sheffield. Her engines, &c., occupy almost one-half of the length of ship, or 240 ft., and comprise five complete sets of tri-compound inverted cylinder engines, cylinders being 45 in., 70 in., and two low-pressure cylinders of 75 in. each, with stroke of 48 in. Steam will be generated in 48 Belleville boilers. Estimated speed is 22 knots.

**SHIPBUILDING IN WALES.**

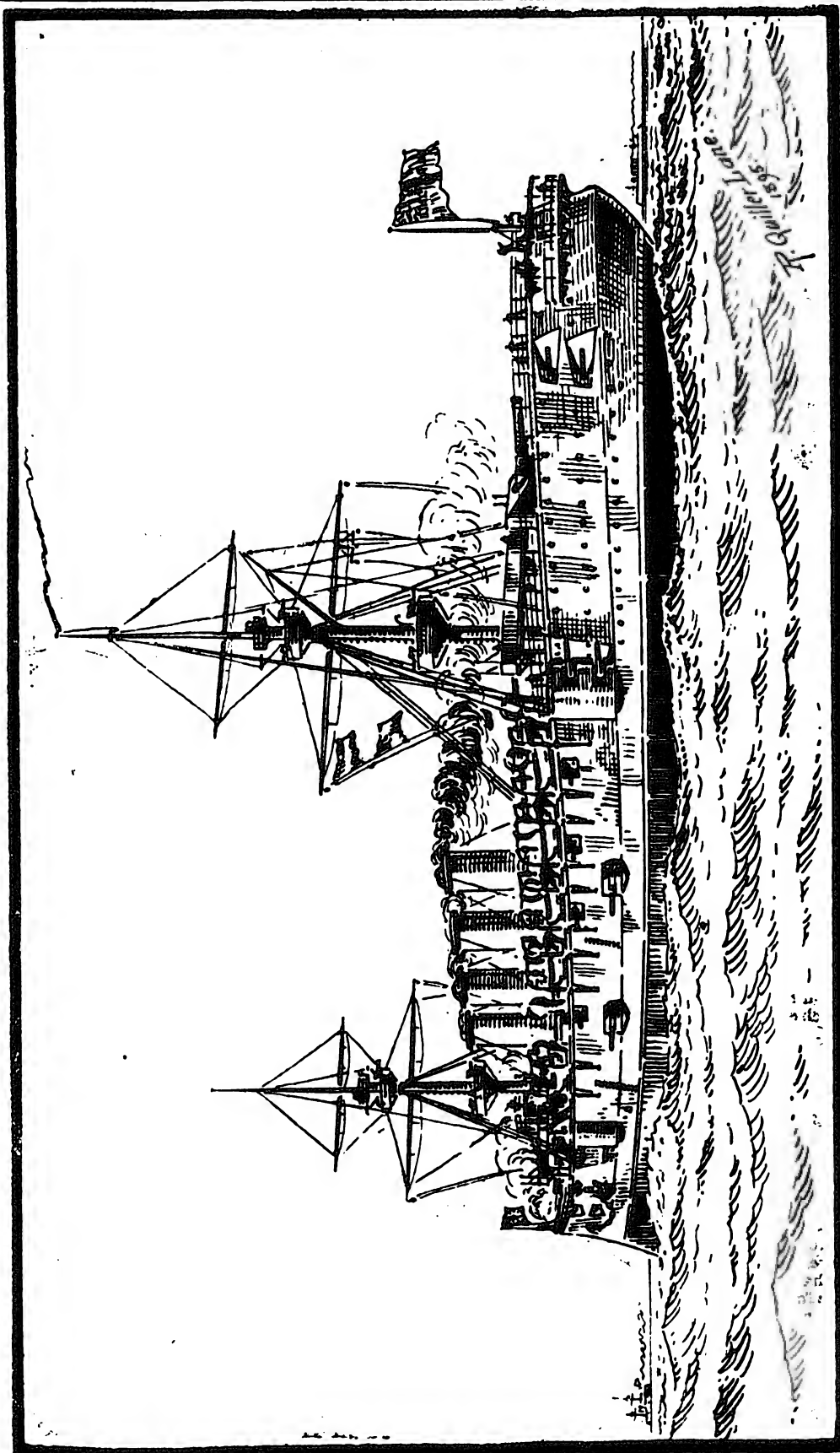
IT appears somewhat strange that at such an important ship-owning port as Cardiff there should be nothing in the way of a shipbuilding yard, more especially as all the raw materials can be had on the spot. The well-known Dowlais Co. some time ago erected blast furnaces within practically a stone's throw of the docks, and steel works erected by the same company are almost completed. Thus Cardiff occupies as admirable a position as any port can well do for shipbuilding. It is true an attempt was made to successfully carry on this industry some eight or nine years ago. Several good ships were turned out, but financially the scheme was a failure. Whether this was due to ill luck, bad management, or what not, we are not prepared to say; but in any case the port did not at that time possess such facilities for securing raw material as at present, for then the nearest steel and iron works were at Dowlais itself, some distance away from Cardiff. But before this an attempt had been made to build iron ships at Newport (Mon.), and a branch of the foundry undertaking of T. Spittle, Limited, is to this day referred to as "The Shipyard." Then certain steamers have also been built at Chepstow, by Ed. Finch & Co., Limited, and at Milford. How these various ventures paid we are unable to say with any degree of certainty; but at any rate, with the exception of Mordey, Carney & Co., Limited, of Newport, little, if any shipbuilding is indulged in in South Wales to-day. The latest attempt was that of Messrs. Oswald & Co., at Milford. They launched several vessels, but as they are no longer building (according to our advices), we presume they found it unprofitable. And perhaps this is not to be wondered at considering the distance Milford is from all source of supply. But before any of these ports went in for ships building, both wood and iron ships had been built at Neath Abbey and Swansea. The cause of the cessation of building at Neath Abbey we have been unable to exactly discover, there are several stories told. But we do know that the old works are now dismantled and that it was only a few months ago that the s.s. *Neath Abbey*, launched at the place whence she gained her name in 1846, was lost off the Nash Point in the Bristol Channel, almost within sight of her birth-place. So far as Swansea as a shipbuilding centre is concerned, the last vessel built there was the brig *Honderklip*. She was built at the Albion Dry Dock and was the smallest of several wooden vessels launched from the same berth. As a matter of

fact Swansea appears to have been the only place in the Bristol Channel where shipbuilding was ever seriously taken up. The then owners of the dry dock and shipyard, the Messrs. Richardson, were themselves practical shipbuilders as well as shipowners, and took a pride in turning out a fine ship. But it was the never-ending working man who put a stop to the Swansea industry. Time and time again did the shipwrights find some cause to squabble just about the time the ships were completed, at the moment when they knew the builders had so much money locked up in the uncompleted hull that it would not pay them to stop work for the sake of a small, apparently, increase of wages, and so Swansea dropped out of the running as a shipbuilding centre. Had these carpenters only possessed ordinary common sense there can be no doubt that Swansea would have become a flourishing shipbuilding centre, for the works of the Landor-Siemens Steel Co. were actually situated within the borough, less than half an hour's walk from the shipyard.

It is this same question of labour which, it is alleged, stops a resumption of shipbuilding at Cardiff. As we have said, an attempt was made some years ago to carry on this industry on the banks of the Taff and within the past few days a director of the old company has been interviewed. He says that to put the old yard into proper working order, equipped with the most modern plant and in every way efficient to compete with North Country builders would entail an expenditure of £120,000. There are, he says, three firms, including his own, prepared to find all the money and he himself will spend at the yard £60,000 a year on new tonnage which he now spends in the North, but his conviction is that nothing can be done until the wages rate fixed by the Trades Unions is made equal for the same class of work all over the country. He alleges that a much lower rate of wages is countenanced by the Union at Hartlepool, for example, than at Cardiff. This is his statement—whether it is correct or not is another matter. We are inclined ourselves to hold the impression that he is incorrect—he must be basing his argument on the present wages paid to iron shipwrights at Cardiff for old work. And even then, experience shows that either wages for old work (e.g., ship repairing) in the Bristol Channel compare favourably with the North Country, or else shipyard managers in Wales lay themselves out to lose money. Two instances supporting this come to us as we write. One is the case of the s.s. *Cheriton*. She sustained extensive damage in the Baltic, and tenders were invited from all quarters for her repairs. The highest tender was that of a North Country firm noted for its cheap cuts, the successful firm was a Bristol Channel one whose price was £500 less than the North Country firm. The other case occurred only the other day. The average price, taking the North Country and Welsh firms, worked out at about £3,400. A Welsh firm secured the job at £1,900. Now, what can we make of all this? On the one hand we have a man ready to expend personally £40,000, two others prepared to each give as much, to establish a shipbuilding yard at Cardiff, but who are held back on account of excessive wages in Wales compared with the North; on the other hand we have repairers in Wales, paying these excessive wages, successfully competing with North Country firms! It is a conundrum and we give it up.

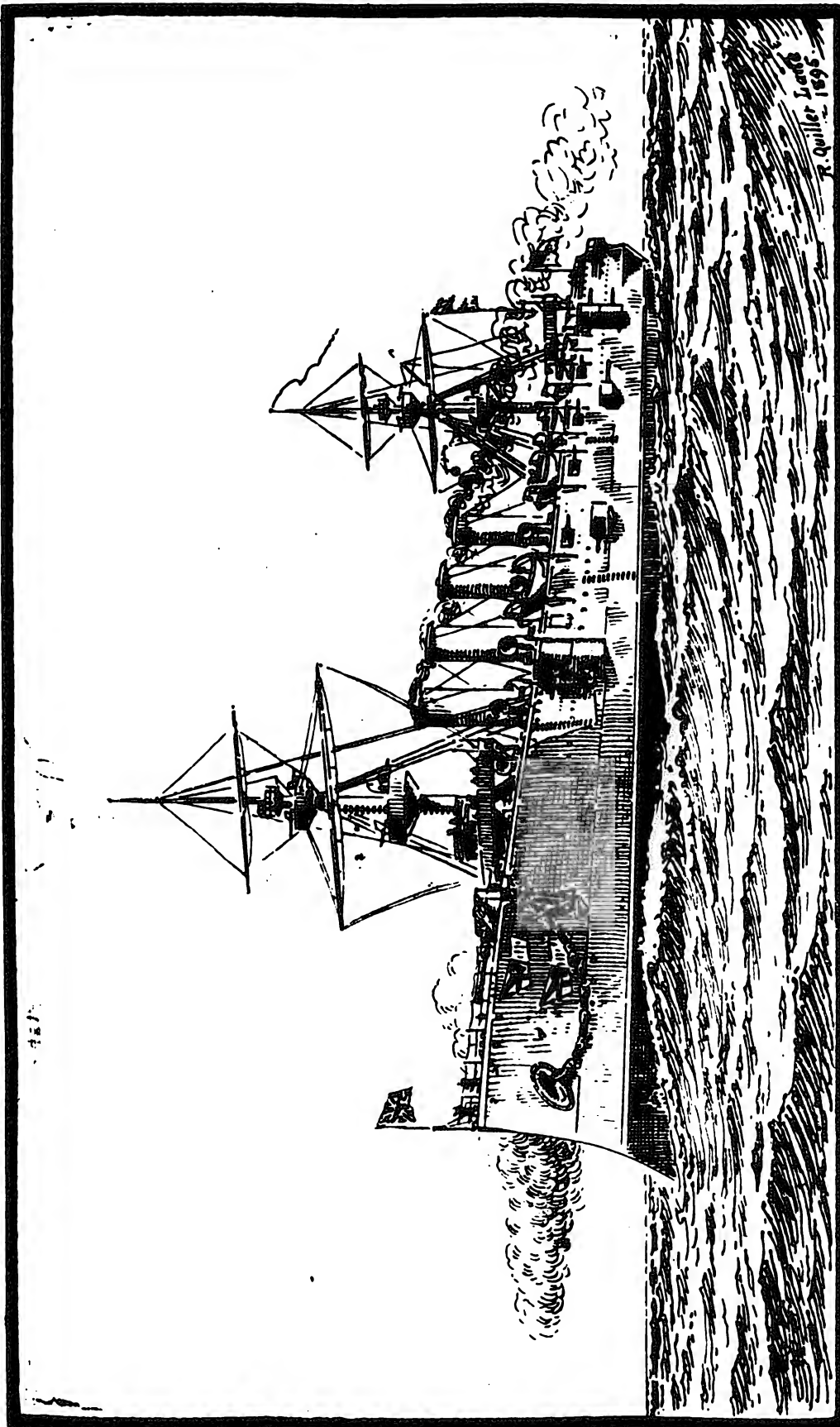
But conundrum or no conundrum, there is the hard, stubborn fact that a group of capitalists are prepared to "plank down" £120,000 for the establishment of a shipbuilding yard at Cardiff and they hesitate because of the labour question. The difficulty is surely one which can soon be put an end to one way or another. There is in existence a Ship Repairers' Federation, the chairman of which is Sir Ed. Harland. This society deals with all the Unions connected with shipbuilding. Let these Cardiff capitalists put their case forward through this body and unless we are very much mistaken the difficulty will soon be removed. At any rate it is worth making the attempt for shipbuilding at Cardiff is worth fighting for.

**New Twin-screw Steamer.**—Messrs. Harland & Wolff, Belfast, have secured an order from the Hamburg American Steamship Co. for a twin-screw steamer of 20,000 tons burden. She will have accommodation for 200 cabin and 1,500 steerage passengers. She is chiefly to be employed for freight. The vessel when completed will be the largest in the world, and is to be delivered in ten months.



H.M. First-Class Cruiser "POWERFUL."—(See page 219.)

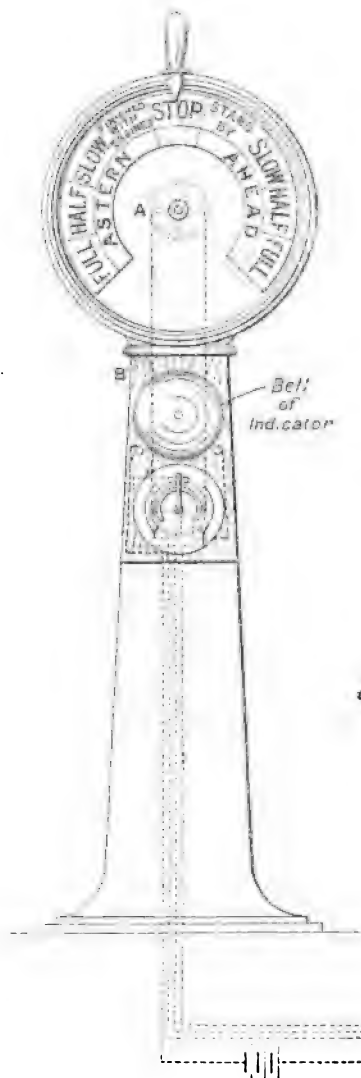




H.M. FIRST-CLASS CRUISER "POWERFUL."—(See page 219.)

## THE WILMOT-THACKERAY PATENT AUDIBLE DIRECTION INDICATOR.

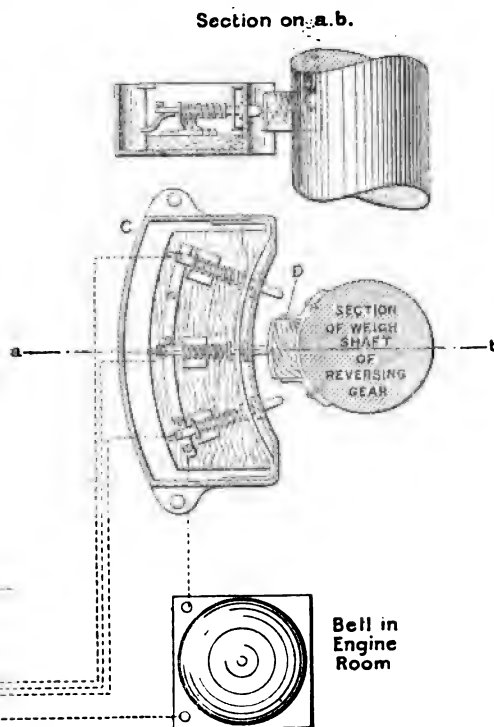
WE have recently inspected a method of communication between the bridge and the engine-room, which has for its object the setting up of an audible indication at both ends of the system, should any orders given by telegraph from the bridge not be carried out. This system offers a double protection,



confirm the order given, the present troublesome reply to orders is rendered unnecessary.

In the accompanying illustrations a small wheel A, fixed to the transmitting wheel, turned in the act of transmitting the order, actuates by means of a chain, the contact maker shown on the drawing. In the case of a single dial telegraph, the contact maker may be arranged on the spindle of the instrument direct. As shown in the drawing, an electric bell and the contact maker are fixed on a wooden baseboard B, this being enclosed in a watertight casing, all risk of oxidation is obviated. It may here be stated that every part of the apparatus is substantially constructed, and that battery power is provided sufficient for four years' supply.

Suitable electrical connections are made, as shown on the drawing, to ensure that on the telegraph being put over to, say, "ahead," the bells shown, one on the bridge and the other in the engine-room, both



as it at once informs the captain whether his orders have been executed, and this in the darkest night, or without his having to move his eyes from the look-out point; and it also renders any mistake on the part of the engineer impossible, as until he has put the links into the requisite position to satisfy the order "ahead," "astern," or "stop," as the case may be, the signal in the engine-room goes on sounding. It is known that mistakes have been made in the hurry of the moment, but where this system is fitted such errors would at once become apparent, and could be immediately rectified; and as the engines themselves

commence to ring, and continue doing so until the movement of the weigh-shaft, corresponding to the order given, is made.

This movement of the weigh-shaft presses in the appropriate one of the three plungers, suitably placed in the casing C, the cover of which is shown removed, and thereby breaking the electrical circuit, the bells cease ringing, and both captain and engineer know that the order has been promptly executed. As will be seen, the projection D, on the weigh-shaft, is so proportioned as to allow of considerable latitude in the position of the links without bringing into action

any change in the electrical conditions; for instance, the section *a, b*, in plan shows that the order "Stop," has been given and obeyed by "middling" the links; but the gear could not be sufficiently moved over to give either "ahead" or "astern" motion to the vessel without the centre plunger being released and thus completing the circuit, would cause both bells to ring until matters were again put right.

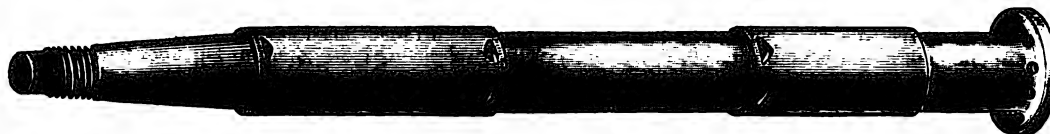
The apparatus described is quite distinct from the ordinary telegraph (*i.e.*, neither interferes with the working of the other), and it thus affords a separate and additional means of communication between the bridge and the engine-room, so that should the ordinary gear of the telegraph get out of order, and the engine-room dial fail to correspond or work with that on the bridge, all the engineer has to do is to move his reversing-gear until the projection on the weigh-shaft stops the indicator bell ringing, showing that he has correctly carried out the given order. The importance of this, especially at a critical moment, cannot be over-estimated.

The gear is now at work on several steamers, giving satisfaction to all concerned, and has been in use for upwards of two years on the Trinity s.s. *Irene*, a vessel doing a large proportion of intricate navigation in frequently shallow waters, and requiring constant manipulation of the engines. In this case the engineer reports, after eighteen months' use, that it "has proved a most efficient apparatus." It has lately been fitted to Mr. Gordon Bennett's steam yacht *Namouna*, and the Niger Coast Protectorate's new steamer *Ivy*.

Any further information may be obtained from the Audible Indicator Syndicate, 22, Great George Street, Westminster, London, S.W.

### SAFETY LINERS FOR PROPELLER SHAFTS.

**A**NY improvement which increases the safety of the propeller shafts and prevents those frequent breakdowns at sea, which owners and underwriters alike deplore, would undoubtedly be of great value, as it deals with a detail which is one of the most treacherous on a modern steamship, and one in which failure is often attended by disastrous consequences.



The fracture of shafts practically always occurs at the ends of the brass liners either at the propeller or within the stern tube, the reason being that the local corrosion which takes place due to galvanic action is intensified by the localised stress on the material at the angle formed by the liner end and the shaft.

It is well known that the easiest way to break a bar of iron is to nick it all round and then give it a sudden blow, and this is exactly what occurs with a propeller shaft, as the line of corrosion is always in a plane at right angles to the axis and therefore has a maximum weakening effect on the shaft.

Mr. D. B. Morison, of Messrs. Thomas Richardson & Sons, Limited, of Hartlepool, has lately patented a design in which the ends of the liners terminate in a zigzag form, the points or projections being kept in

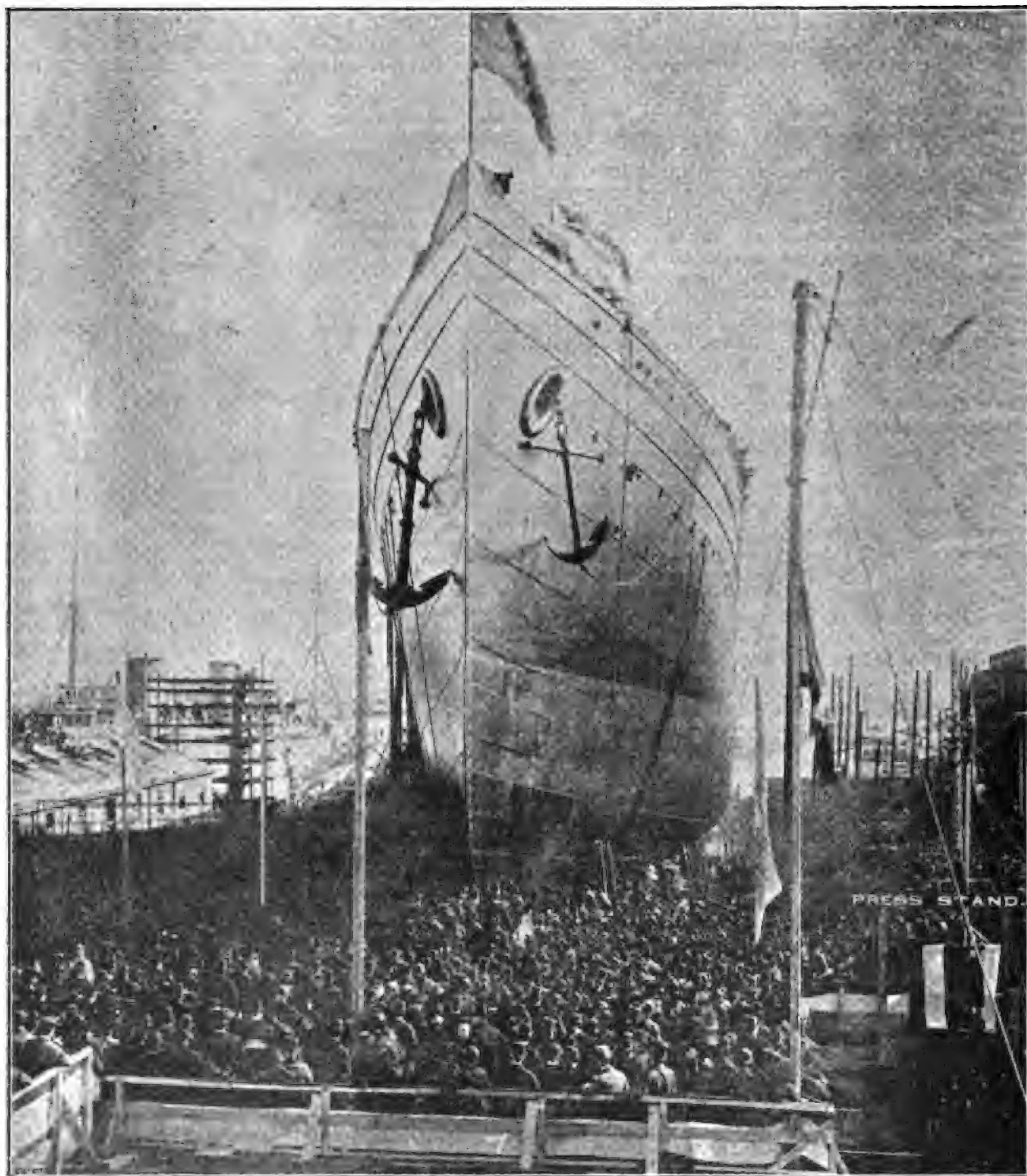


contact with the shaft by a strengthening ring extending either partially or entirely over the projections. The effect of this is, that even if corrosion did occur it would not be located in a plane at right angles to the axis, but in a line offering greater resistance, or in other words, the area of resistance through a possible line of corrosion would be greater than the original cross area of the shaft. The formation of the liner end is, however, very suitable for filling with elastic cement, which prevents the corrosive action entirely, but if by accident any part did become exposed to water, then the effect would not be dangerous, as the shaft would not be appreciably weakened.

The design, although specially suitable for the liner ends which are exposed within the stern tube, is equally applicable to the propeller end of shafts which are covered throughout with brass, as although in the latter means are frequently adopted for making a

joint between the end of the brass liner and the boss of the propeller by means of a rubber ring, or a recess in the propeller boss, yet numerous accidents have occurred through insidious leakage causing rapid and dangerous local grooving, especially if the shafts are of steel.

The simple and effective design proposed by Mr. Morison will entirely obviate this danger, and when the possibilities arising from the loss of a propeller at sea are realised, such remedies warrant the attention of those who are responsible for the safety of marine machinery.



BOW VIEW OF THE AMERICAN LINER "ST. LOUIS."

**THE AMERICAN LINE.**

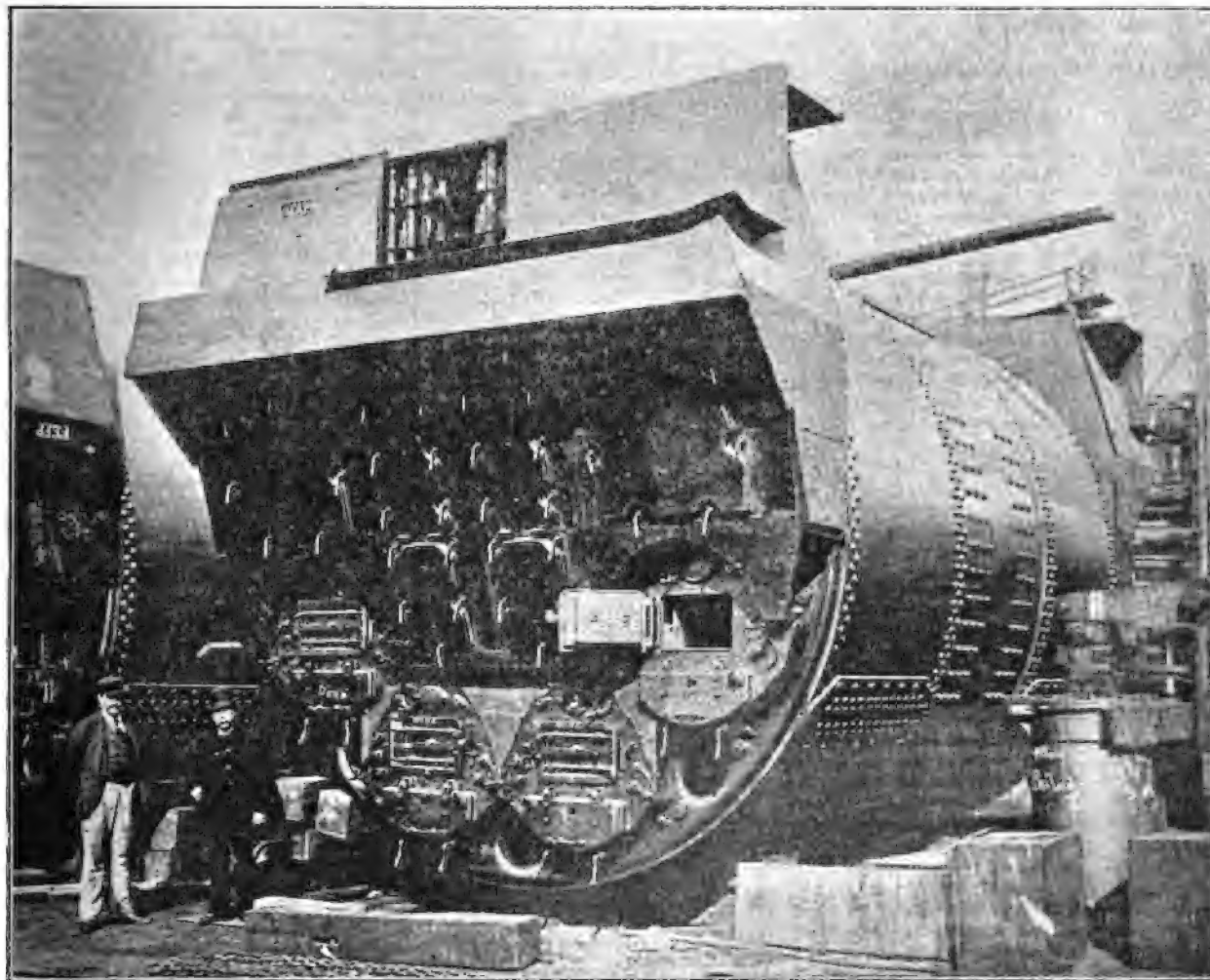
**W**E have already published descriptions, and through the courtesy of the owners we have pleasure in giving to our readers a first series of illustrations of the latest magnificent addition to the fleet of the American Line, New York to Southampton,

comprising in this issue views of the *St. Louis* upon the stocks, and her boilers. We shall follow these in our next issue with her deck plan, general view of the vessel afloat and her engines.

The International Navigation Co. of New York has worthily crowned its initial enterprise of founding a Transatlantic Line deservedly rivalling the great

lines from Liverpool, and the purchase of the famous liners, the *City of Paris* and the *City of New York*, which thenceforward have borne triumphantly the stars and stripes, by the construction of two new steamships entirely with American capital and workmanship, which should surpass the purchased liners both in tonnage, and it is hoped in speed and comfort of accommodation. These vessels are the *St. Louis* and *St. Paul*, of 11,600 tonnage, and of 20,000 calculated I.H.P. They are 554 ft. in length,

expansion, and are designed with several new notions embodied in them, which was to be expected from such an original people as the Americans. The internal decorations and arrangements for the comfort of passengers, including of course, electric lights everywhere, are on a scale of luxury and elegance which is said to be as yet unknown in Atlantic liners, and the innovation of lunches or dinners in the open air is to be encouraged by the provision of a special deck pantry for the purpose in communication by a lift



BOILERS OF THE AMERICAN LINER "ST. LOUIS."

by 63 ft. in breadth, and are twin-screw ships, the shaft stern tubes being prominent in the stern view we show upon the stocks, the propeller bosses being ready for attachment thereto of the blades. The saloons, state-rooms, and smoking and other cabins, are distributed over five decks, the promenade deck being the fifth, and the saloon and library on the deck below it. The vessels boilers and engines have been two years in construction, but all are now ready simultaneously. There are ten boilers to each ship, containing, it is said, over 13 miles of tubing, six boilers being double-ended, and four single-ended. The engines are of the latest improved type, quadruple-

with kitchens and store-rooms. The library is to be fitted up as a liberal education in itself, and it is said that life in one of the private suites of apartments, comprising a bath-room and all conveniences, will be equal to the luxury and comfort of a first-class hotel.

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**Cable Laying Gear.**—The twin screw steamer which Messrs. Lobnitz & Co. are about to build for the Japanese Government will be fitted complete with cable laying gear of the most modern design by Messrs. Johnson & Phillips and also with electric lighting plant and fittings for the whole of the vessel. We hope to publish particulars later on.



## THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

### The Prince of Wales at Southampton.

ON Saturday, the 3rd inst., the Southampton Docks were *en fete*. As the 9.15 train from Waterloo ran into the docks with the regular passengers for the Channel Islands, and some of the company's guests for the day's ceremony, it was noticeable how crowded was Canute Road with the flocking of local people to the new ground, and that in spite of the heavy rain which was falling. Inside the docks everything wore a holiday aspect. Most of the vessels were dressed with bunting from stem to stern. In the Empress Dock lay the Indian trooper *Clive* and the Union liner *Scot*, looking their best in their white paint. The latter of these was just about to start for the Cape. Their paint looked whiter from its contrast with the dark hulls of a big West India Mail boat, and of the *Berlin*, which was scheduled to sail at noon for New York. It was



STERN VIEW OF THE AMERICAN LINER "ST. LOUIS."

some little time, however, from the arrival of the train till the commencement of the day's function, and there was no great desire evinced on the part of the visitors to wander down the new Itchen Quay and see the amount of work already accomplished at the back of the graving dock as there might have been had not nature—as Mr. Wyndham Portal, the chairman of the railway company, humorously expressed it at the luncheon—been "weeping tears of joy" in honour of the occasion. An opportunity was, however, afforded to visit the engine-house, where are situate the two gigantic Gwynne pumps which have the duty of emptying the big dock. The capacity of this dock of 750 ft. in length, and 90 ft. maximum breadth, is no less than 73,000 tons, and the centrifugal pumps installed by Messrs. Gwynne are guaranteed to perform the work of clearing it in two hours and a quarter. This means that they must lift and get away some 540 tons of water per minute. The suction pipes are no less than 48 in. in diameter.

Punctually at 1.30 the Royal yacht *Osborne* came alongside the new Itchen Quay, to the south of the entrance to the Empress Dock, at the spot where shortly a berth for the embarkation and discharge of passengers and mails will be

allotted to the North German Lloyd Line. Owing perhaps to the precious cargo she bore—for we know there is no violent rush of tide at Southampton, and that the Itchen is well sheltered from the wind—the berthing of the *Osborne* was a very long matter, occupying some twenty-five minutes. Then the Royal party came ashore, received by the railway authorities and the Mayor and Corporation of Southampton, the latter in their robes. A guard of honour of the Second Hants Volunteers was posted. The choice of the corps was singularly appropriate, for the men composing it are engaged in regular work in the docks. The Royal party consisted of the Prince and Princess of Wales, the Duke of York, and the Princesses Victoria and Maud of Wales. These advanced to a little tent at the entrance to the new graving dock and on the Itchen side of it. Here was a lever fastened by a gold chain, which, in turn, was secured by a padlock of the same metal, studded with diamonds, which were arranged so as to exhibit the arms of the South-Western Railway and the crest of the Prince, together with an inscription commemorative of the occasion and date. Releasing the lever and turning it, the Prince declared the dock open, and in an instant two huge waterfalls commenced to fill the dock. The sight was very impressive as one stood on the caisson and gazed on to the bottom of the dock 40 ft. below. The water, lashed into foam with its own impetus, dashed quickly over the huge floor of the dock, whilst the spray flew up in our faces. The dock was quickly filling as the usual prayers were read by the Bishop of Guildford. Addresses had, of course, been presented and acknowledged. Then an adjournment was made to a railway shed adjacent, where luncheon was provided for some 400 guests. The Royal ladies had returned to their yacht, but the Prince and the Duke of York sat on each side of Mr. Portal. There were also present a number of members of Parliament, including Sir William Harcourt and Sir Richard Webster, and other distinguished guests, such as Sir Massey Shaw. The speeches were of the type usual on such occasions. The Prince of Wales made an excellent point when he wondered at the rapidity with which the work had been carried out, and we were reminded that the very land on which the shed we sat in stood had not existed two years previously, for the site was then occupied by the waters of the Solent. The chairman referred to the rapid development of the port which had recently dealt with some 75,000 tons of shipping, inwards and outwards together, in some four days.

The equipment of the dock is already in a fair state of completion. There is a 30-ton crane already erected and the railway runs to the Itchen side of the graving dock, which is now called after the Prince who opened it. The caisson which closes the entrance to the dock is not the least interesting part of the installation. It is built like a ship with two bows. Its dimensions are considerable, the length being nearly 90 ft. and its depth nearly 40 ft. Its beam is 16 ft. at the topside, but about half way up it is as much as 26 ft. There is a water-tight deck at the widest part. The weight is 440 tons. There is added, however, 480 tons of iron ballast to steady it, so that its light displacement is 920 tons. At this weight it is floated in and out of position. When it is in position it is fixed to the masonry by great bolts, after being sunk to its proper level by the admission of some 500 tons of water. The upper deck is crossed by the line of railway to which I have already referred.

Yet it must not be supposed that even the present scheme of work at Southampton is yet completed. There are hydraulic installations to be finished for the provision of power and there is also the large work of providing berths for liners on the faces to the Test and to the Water.

Already, however, Southampton is self-contained, for she can dock her own ships, and Tilbury will miss the periodic visits of the *Paris* and the *New York*.

### The New Irish Mail Contract.

Some very interesting particulars as to the terms and effect of the new Irish Mail Contract, which comes into force on the 1st April, 1897, have transpired from the circular which has been addressed by their secretary to the shareholders in the City of Dublin Steam Packet Co., with whom the Post Office have arranged for the sea transit. The writer of the circular compares the terms of the new contract with those of the old one, which took effect from the year 1860, and to which the public is indebted for the building of the famous quartet whose names are taken from those of the four provinces of Ireland.

I have tabulated the material points of the two contracts.

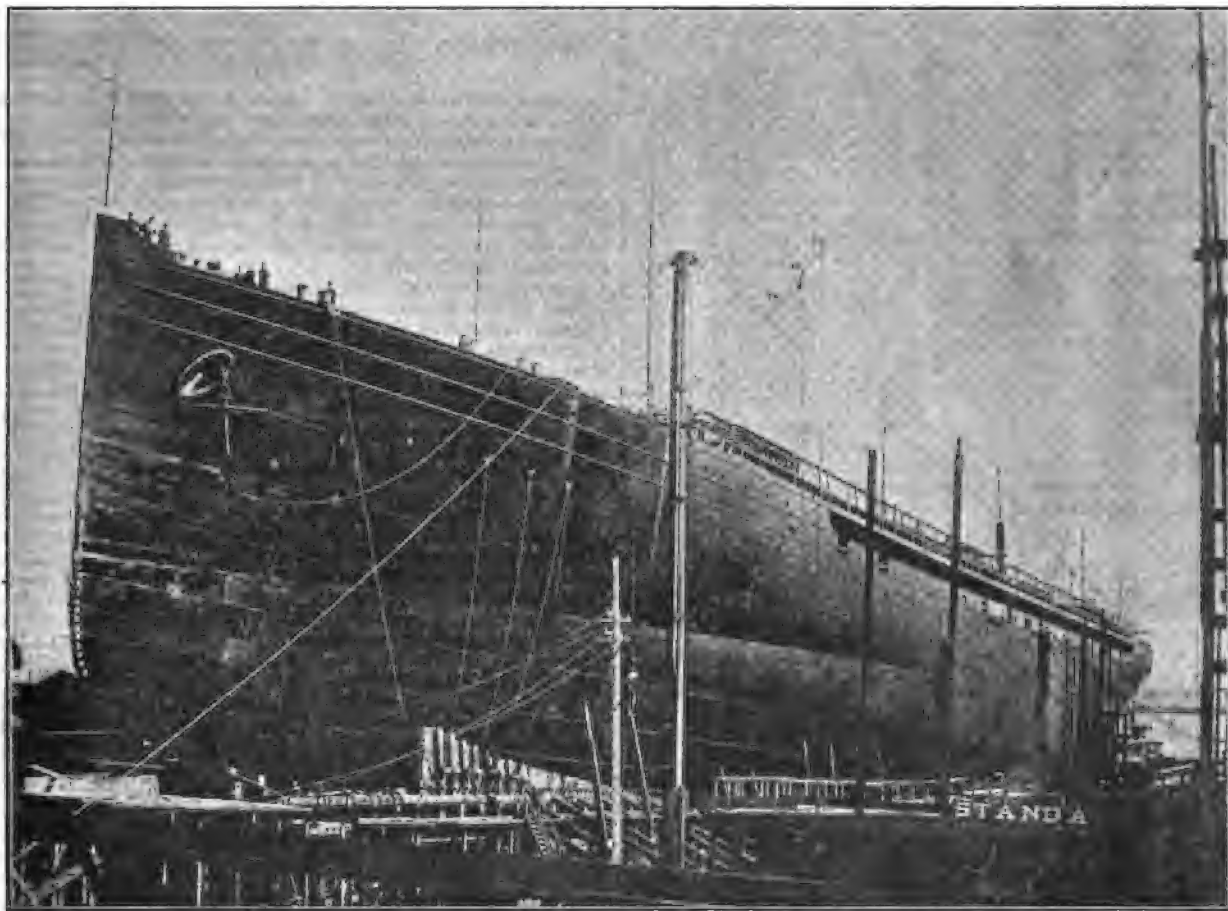
	1860.		1897.
Number of ships agreed upon	4	..	4
Period of contract (in years)	14	..	20
Yearly consideration ..	£84,000	..	£100,000
Speed in knots on trial	18.367 (max.)	..	25 (max.)
Kind of engines	Simple	..	Triple-expansion
Mode of propulsion	Paddle	..	Twin-screw

Apparently the Government are paying £16,000 a year more than formerly for an increase of something over four knots speed. But the speed will be improved something more than this. For the 23 knots is to be the maximum speed of all the vessels in the new contract. To get it the actual trial speed will have to be something higher to allow for contingencies. The speed I have given for the 1860 fleet as a maximum was that on actual trial of the best of the bunch. Again, the

We know well that coal consumption is the chief item of expenditure in the working of this class of boats. The substitution of modern triple-expansion engines driving their screw for low-pressure engines working paddle wheels will prevent such an addition to the coal bill as might be anticipated from the great increase of speed. Wise treatment of the travelling public, with the opportunity of using such fine boats as the new liners must be, will probably make the contract a very profitable one for the undertakers.

#### Liverpool Improvements.

There is a suggestion abroad that Liverpool can go one better than its Southern rival, and that in a way in which there can be no imitation. Probably no part of the experience of the modern ocean traveller is so tedious as the



THE AMERICAN LINER "ST. LOUIS."

consideration payable in the old days was subject to a deduction to the amount of half the yearly receipts from passenger traffic, whenever these amounted to more than £35,000 per annum. With a growing trade this deduction might become a very serious diminution of the company's subsidy. In the new contract they have got rid of it altogether by accepting on its account a yearly deduction from the amount payable by the Post Office of some £2,000. Thus they have the passenger traffic entirely for themselves, and if they can increase it so much the better for them, and for them only.

The new boats are to cost some £400,000 as against £369,000 for the four old mail steamers. But the method of payment for each fleet is by debentures, redeemable within the whole period for which the contract extends. Thus it will be seen that the burden of the new fleet, whose payment is spread over a period of twenty years, is actually less than that of the old, which had to be cleared off in some fourteen. This makes a difference in charges of over £4,000 to the right side of the company's ledger each year.

examination of baggage at the customs on landing. He sees coal and money lavished on saving fractions of minutes at sea and when he has reached port the race with the mails still continues. They are hurried off the ship as quickly as experienced men in numbers as great as can work without interfering with one another can accomplish the transfer, and are shipped aboard a waiting special train for St. Martin's-le-Grand. He, however, is condemned to wait his turn for baggage examination and his railroad facilities are only available when the baggage examination of all the saloon passengers going forward is accomplished. Various methods of removing this drawback have been suggested. One is having the examination in the train itself. Space and other considerations forbid. Again, it has been said, "Have it at the London terminus." But the answer here is obvious. There would be no advantage whatever in doing this, for the delay would be incurred as before. It matters little to the passenger whether his delay is under the shed at the port of debarkation or under the roof the London termi-

undergone all the same and in either event his cab passes out of the London station at the same time, for there has been no combination of examination and progress in either case. We must therefore hit upon some method of combining the two, by making the inspection while the passenger is *en route*. That can be done by shipping the Customs officers at Queens-town and letting them examine the baggage as the vessel runs up channel. The objection is at once raised that "To do so is impossible." Very well. We heard that it was impossible to dredge the Mersey bar, that it was impossible to bring liners alongside in the Liverpool river. Yet the bar is gone and liners now attract no attention as they occupy the Atlantic berth at the Landing Stage. This excuse of impossibility is merely a plea to avoid the trouble of thinking and planning new arrangements. Nothing is impossible when it means retaining the cream of the Atlantic trade. I grant that it would be necessary to have other arrangements to those that now prevail. All baggage that is to be sent forward under this arrangement would need to be booked at New York, and to be put in a separate place. Greater space would have to be allotted to the "Not wanted baggage-room." But all this is detail, and passenger traffic is more valuable even than a little space even in an Atlantic liner. Look at the space that is lavished on the main companion in these modern vessels. Yet a baggage-room that saved a couple of hours in transit between New York and London would be a greater boon to the traveller, and therefore a better investment to the shipowner, than all the main companions that ever went to sea. Here too, he is not offering facilities to-day which to-morrow will be offered also by the rival port. To make such advances is a short-sighted game, for it only leads to giving something else a little later on to win back the advantage again. For this attraction cannot be copied by the line which has no outport to call at. Queens-town, instead of a source of weakness, becomes a tower of strength if such a suggestion be adopted, and that it is feasible to those who want to do it is proved by the fact that the Glasgow people are agitating for baggage examination aboard their steamers as they come across from Moville. But if Liverpool waits too long Southampton will somehow or other manage to circumvent the position and deprive her rival of the grace of giving the boon.

#### A Naval Greyhound.

The United States Government is one which seems trammelled by no traditions of a kind to prevent it putting its warships to proper tests. The Americans, as we, have recognised the importance of building cruisers which can not only maintain a high speed for a short burst, but can cross the Atlantic at the speed prevailing amongst ocean mail steamers. Whilst we have never allowed one of our ships to show her mettle in this regard, the Americans have directed one of their "commerce-destroyers," the triple-screw cruiser *Columbia*, to prove what she really could do. The weather on the occasion is said to have been unfavourable, but nevertheless the passage was made in less time than had ever been occupied by any warship of any nation. Her passage was 11 minutes under the week from the Needles to Sandy Hook. But the details of the trip are to my mind the most interesting part. She is said, on this trip, to have for a distance of eight miles, maintained a speed of 25.8 knots. This is a speed which even the new Cunarders could not reach unless they had a strong tide racing under them. But 22.81 knots was her best for a space of four hours. Here she must lower her colours to the *Campania*, for the latter has maintained a speed of 22.8 knots for a full twenty-four hours run on an eastward trip. But as we take longer periods the warship's average falls off. Her best day's run was 473 miles. This is equivalent to an average of 18.8 knots. This day's run has been beaten by many mail steamers. It ceased to be the record as long ago as the year 1884, when the old National liner *America*, on her maiden trip, ran 477 miles to the westward on the second day of her voyage. One of the earliest voyages of the ill-fated *Oregon* put the mean speed, for a west bound passage, up to 18.57 knots, which is well ahead of the *Columbia's* average of 18.41 knots throughout the present trip. It is certain then that the Cunard have four vessels whose sea-speed, over great distances, is far superior to this warship's, whilst the White Star Line have two. I do not think it fair yet to speak of the speed of the *St. Louis* and *St. Paul*, but it is probable that these will also be faster than she is. The *Paris* and *New York* and the Hamburg express boats would also beat her performance. But, on the other side, it must be remembered that the *Columbia* did this run under

unfavourable conditions, with engine-room and stokehold crews not accustomed to this class of work, whilst, above all, it must not be forgotten that the figures I have given as to mail steamers are picked from the performances of many voyages of each vessel. In the case of several of the merchant ships referred to, it would not be difficult to find summer trips wherein they had not beaten the *Columbia's* record. It must not be forgotten, too, that all the mail steamers named have a length of at least 500 ft. It is on all hands agreed that sufficient length is absolutely necessary to enable a ship to maintain a good average speed in ordinary Atlantic weather. The *Columbia's* length is only 412 ft. Placed at a constitutional disadvantage of this kind we cannot help the conclusion that her performance was a splendid one. It seems a thousand pities too that the *Blake* and *Blenheim*, each of which has crossed the Atlantic, has not been allowed to show the pace which a ship of the Royal Navy can maintain.

#### The Hardships attending the Possession of a Board of Trade Certificate

are constantly being brought before the observation of some of us. I see men in other professions make mistakes of judgment and no loss of professional status befalls them. It always seems a terrible thing that a moment's carelessness may blast the career built up by years of careful attention to duty. But the same momentary forgetfulness wrecks a good ship and puts many lives in jeopardy, and so perhaps there is much to be said in favour of the practices of suspending certificates where default has been found.

One's gorge however rises at the exception taken by a shareholder at the London and South Western Railway meeting (Heaven forbid that I should gratify his vanity by naming him), who objected to the usual vote of thanks to the staff because he feared it applied to the captain of the recently lost Channel steamer. This shareholder had heard that when an officer lost a ship, the P. & O.'s practice was "to excommunicate him in any event from any future employment by the company." The shareholder approved of that course of action because "it was quite impossible for a layman to comprehend the doubts and mysteries which belong to the sea." This person's sense is equal to his charity. (Laymen are not supposed to understand where the onus for an accident in navigation lies any more than they are expected to discover a leaky valve in a steam engine in which they may have an infinitesimal share. They pay—or help to pay—experts to settle all these matters for them, and trouble enough occurs to the man whose ship meets with an accident without irresponsible shareholders trying to harden the hearts of the company's officials against him. The automatic rule of discharge for accident is a most cruel and unjust one, and it is one which must repay in its own coin the concern which insists upon its observance by preventing the best class of officer from accepting service with it.)

#### The Boston Trade

has had a bad turn apparently. The new Cunarder *Sylvania* made only two trips in the line's extra service and was then laid up. The sister ship *Carinthia* was delivered by her builders and laid up without making a trip at all. Two of the crack Warren boats, the twin-screw *Sootman* and the *Angloman*, are turned over to the Dominion Line's Liverpool and St. Lawrence service.

#### The "Georgic."

A few brief particulars of this big ship appeared last month in the *MARINE ENGINEER* with the illustrations. I am now enabled to add a few more which will certainly be of interest. The vessel's nett register is 6,570 tons, and her gross 10,077 tons. The deadweight capacity being 12,820 tons. At a load draught of 28 ft. 6 in. her displacement is 20,166 tons. Her water ballast space will contain no less than 4,895 tons, there being a cellular double bottom of a capacity of 1,900 tons and two deep tanks of a combined capacity of 2,990 tons. The engines are 4,500 I.H.P., and consists of two sets of triples by the builders of the ship. The cylinders are 24 in., 89½ in., and 65½ in. in diameter with a stroke of 51 in. She has four steel boilers, of which two are single-ended and two double-ended. There are to these 22 furnaces with Morison's patent flues. The grate area is 394 square feet, and the heating surface 18,294 square feet. Steam is supplied to the engines at 200 lbs. pressure. There is a complete installation of electric light and a refrigerating installation by Messrs. Hall, of Dartford. The

usual appliances for economy of coal and for the prolongation of the life of the boilers, such as feed heaters and evaporators, are fitted. The steam steering gear is of the builders' patent type. She has three steel decks, besides the upper deck, bridge deck, and shelter deck. The accommodation, though not very extensive, is very comfortable and well-planned. The ship left Belfast for Liverpool on the 8th August, under the command of Captain Parsell. She proceeded on her maiden trip to New York on the 16th, in charge of Captain Smith, formerly of the company's veteran the *Oceanic*.

#### Welcome the coming, speed the parting guest.

There is some talk of the establishment of a new line of steamships between Cardiff and New York. Though the vessels are to derive the bulk of their traffic from the cargo they are to carry, the passenger business is not to be entirely neglected, and perhaps, if the anticipations of the founders are in any way realised, we may see Cardiff competing with Southampton or Milford as one of the great passenger ports in the North Atlantic trade. As the Marquis of Bute and the kings of Cardiff are in favour of the new venture, we may, at all events, look to a good send off to the scheme.

At the same time there seems more than rumour as to the absorption of the National Steamship Co. This old-established passenger line has not flourished of recent years. It had not for a long time—some ten years or so—made any additions to its fleet when it made the bold move of building its first *America*, the greyhound which ran the ill-fated *Oregon* so close. Still the National had fair prospects then. But it learnt that one flyer does not make a line, and, selling the *America* forewent its ambition, going shortly afterwards altogether out of the passenger trade and confining its attention to goods and cattle. It also deserted the Mersey for the Thames. But at its new port competition was quite severe enough with the vessels of the Wilson-Hill Line and the new and economical twin-screw boats of the Atlantic Transport Co. Reports are current and persistent that the old line, after some thirty-two years existence, is about to merge its identity in another concern. If these rumours are found to have any real foundation I will give a short history of the line in a future note.

As with lines so with individual ships. The African Line is about to part with a couple of old servants which are no longer suitable for its trade. These are the Mersey built *Ambria*, and the Clyde built *Gaboon*. It seems recognised by most Liverpool lines that the only way to make a living now-a-days is to be rigidly economical, that is, to provide the most perfect instruments which the modern shipbuilder can provide for dividend getting and to waste no money whatever in keeping on vessels which have lost the earning faculty. As soon as a vessel shows signs of not being abreast of the times she is sold, and not allowed to eat her head off in depreciation and charges for lying up. Though this fact is so clearly appreciated by the smaller concerns on the Mersey, it is strange that the one conspicuous exception to the practice is one of the premier lines, not only of the Mersey, but of the whole kingdom. This line's aversion to parting with its useless old stagers becomes more marked every day. I have long referred to it in this column, and now I see that many other writers are commenting on the extraordinary policy which is pursued by those at the head of this company's affairs.

The Pacific Steam Navigation Co., which has built several vessels recently at Belfast, has just placed another order. This time they go to the Clyde. The class of ship they are ordering is not, however, quite of the type they got at Queen's Island, being intended for the trade on the coast, not for the main line traffic.

By the way, the P.S.N. liner *Britannia*, built by Laird's some 22 years ago, has just made the fastest trip of her career, coming home from Valparaiso to Plymouth in 32 days 18½ hours. She is a vessel known alike in the Pacific and in the Australian trades, for she at one time made one of the Orient Co.'s fleet.

#### The "Elbe."

The last of the numerous enquiries into the *Elbe* disaster is at length closed. For all the complaints that are made about British courts and the law's delays in England—and delay and expense are synonymous terms everywhere—it was a German court that brought up the rear. The Admiralty Court of Bremerhaven have published their finding. They blame the mate of the *Crathie* for the collision, accepting the story about the mate and the look-out going into the ship's galley to chat. The officer in charge of the *Elbe* was, however, considered as in

default for not attracting the attention of those on board the *Crathie* by means of his whistle or for not manœuvring to avoid the collision. The behaviour of the *Elbe's* captain and crew after the collision and their exertions for the salvage of life are referred to with praise, whilst the British sailors of the *Wildflower* come in for their share of commendation. It is interesting to observe, after all that was said in the *Fatherland* at the time of the accident, that the Admiralty Court distinctly finds that the *Crathie's* people were not to blame for not standing by the ill-fated mail steamer. There are recommendations as to drill and boat arrangements on board transatlantic steamers in view of the recurrence of such disasters. But it does not seem to me, in view of the sudden and unexpected way in which the *Elbe* listed, that any amount of practice could have availed. What is wanted is some invention whereby boats can be launched when the ship has gone over on to her beam ends, and this at present seems beyond the ingenuity of inventors.

#### The Canadian Pacific Liners and the Royal Naval Reserve.

Sir George Baden Powell has just ventilated a very legitimate grievance of the crews of the fine Empress boats which are employed by the Canadian Pacific Railroad in running between Vancouver and Hong Kong. As will be generally remembered, these vessels were specially built with a view to their adaptability for use as armed cruisers in case of war. As such they are in receipt of a small annual subvention from the Government, and warlike stores are provided for their use in case of need. One of the conditions of their contract with the Government is that a certain proportion of their crews shall consist of members of the Royal Naval Reserve. Now it is well known that these ships are not likely to return to European waters for years. It is equally well-known that the crews of the best class of mail steamers remain in the same service, and often in the same ships for very long periods. This is to the advantage of all concerned, including the Government. For if occasion for the taking up of such vessels should ever unhappily arise it would be a vast advantage to the country that they should be manned by men so steady as such must be and as thoroughly acquainted with the vessel they man. Yet the members of the Royal Naval Reserve are bound by the regulations to report themselves annually in Great Britain or they lose their fees and cease to be members of the force. That the men should give up their employment and return to report themselves is out of the question, and if it were reasonable to expect them to do so, their leaving their ships would be to the public disadvantage, and so the Government is about to alter the Act of Parliament which controls the point, so as to allow them to be paid and re-enrolled on the Pacific station.

#### Casualties.

I have long been astonished at the fact that both P. & O. and the Castle Line adhere to the single screw principle when their competitors have adopted the twin principle. The disadvantages of unduplicated machinery have again been brought home to the great Eastern line by the mishap to their crack mail steamer *Australia*, outbound to the continent after which she is called. She sustained an injury to the lining of one of her cylinders after leaving Aden, and arrived at Colombo after an eight-day passage. There she was detained for repairs for six days and a-half, getting away only half-a-day before the *Ormuz*, which carried the mails of a week later date. One does not suppose that the accident to the cylinder would have been avoided by a duplication of the main engines, but there is no doubt that there would have been great economy of time if the vessel had had twin screws. For she would have had a set of engines to take her into Colombo, and even if it had been considered unwise to venture across the Indian Ocean with a single screw it might have been possible to have proceeded with one sound set of engines, and the other set working with the disabled cylinder cut out. In any case it would have been easier to execute repairs in a twin-screw steamer as the individual parts would necessarily have been smaller and handier.

*La Touraine* has again showed her owners how wise they were in adopting the double principle in her case. On her last outward trip she struck some wreckage and damaged some of her after plates when crossing the banks of Newfoundland. In the result she was unable to work her port propeller, but made New York with very slight delay. On arrival she was docked in the Erie Basin—where not long afterwards she succeeded by *Valkyrie III*—and had her repairs

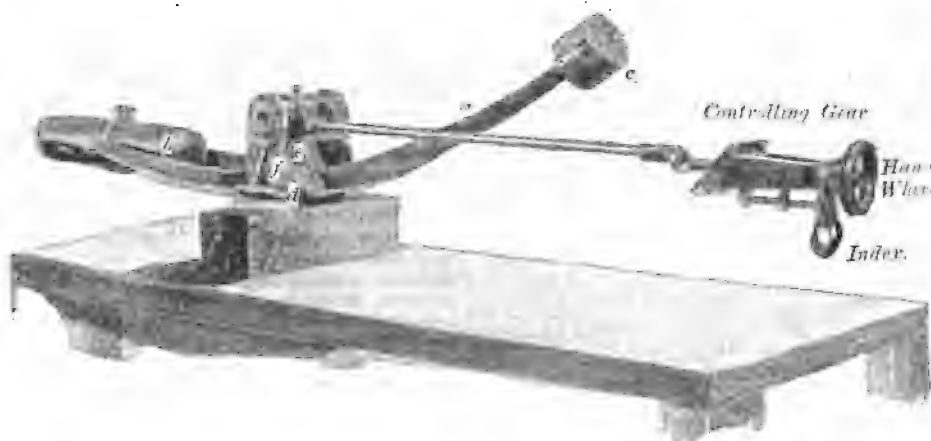
time for her to take her regular turn on her eastward trip. Thus she for the first time gave the Americans the chance of seeing the underwater lines of the famous French record breaker.

The loss of the Brighton Railway Co.'s steamer *Seaford* is a very serious matter for owners and passengers alike, as everything on board this fine new boat went down with her. A great deal of credit is due to the officers of both ships for the fact that of the 297 persons on board all were so safely and rapidly transferred from the sinking ship, although it is true that the conditions of sea and hour were all favourable. Captain Sharp, of the *Seaford*, is the company's commodore. He was the hero of the *Paris* incident when that steamer was thirty-six hours at sea in a very heavy gale, and he brought her safely into port though her machinery was broken down. It is as yet impossible and utterly improper to discuss the question as to whether there was any blame anywhere, or, if there was any, to say if it, or part of it, lay with Captain Sharp. We must assume that so good a sailor did not make any error. Yet his ship lies at the bottom of the English Channel. If the unvarying automatic rule spoken of in reference to the loss of the *Diana* were in force in the Brighton service, Captain Sharp would not get another ship. I do not dwell on the fact that this might be unfair to him, for I have already expressed a strong opinion that in many cases it is most unjust to officers, but I say that it would be a most disastrous thing for the interests of the shareholders in the company themselves if they

supplied to various steam users, the British Admiralty being one of the first to recognise its value.

We understand that Messrs. Thornycroft have now a large number under construction, and have supplied complete installations for H.M.S. *Speedy*, *Halcyon*, *Blake*, &c., &c., besides those for several torpedo-boat destroyers under construction and already in service.

Its use has in every case been most successful, and it is easy to see why it should be so. The complete gear, with its valve and governing arrangement, is inside the boiler itself, and there is therefore a total absence of any parts liable to disarrangement, such as is introduced by the packing of glands, &c., &c. This will be clearly understood on reference to the cut. Of course the mechanism for the setting of the gear to feed at any desired working level is carried to any convenient position outside the boiler. From here, the fulcrum of the lever carrying the float, and at its other end a counter balance, is caused either to rise or fall; doing so the float has to find a new level, regulating the feeding through a double beat valve attached to the lever.



parted with a commander so well known and respected, and one whom the passengers of the ill-fated ship considered to have done so much towards rendering the occasion one which did not involve loss of life. If those who approve of the inexorable law of dismissal can point to the practice of the P. & O. Co. I can cite on the opposite side the precedents of two very famous Liverpool companies who stand by their employés. I mean Cunard's and the Pacific Steam Navigation Co. The former had a captain years ago who met with a partial loss and had his certificate suspended in consequence by the Board of Trade. The owners could not oppose the decision of the department, but they laid the ship up until the captain's period of suspension was over, and then restored him to her command. The justification of this policy is seen in the fact that they have had such a record for safety as has never been equalled by any other line. The Pacific Co. also stands by its captains when they are not in default.

### AUTOMATIC FEED REGULATOR.

THE Thornycroft Patent Boiler Feed Regulator is designed to meet a long-felt want in connection with the regulation of feed-water supply to steam boilers. Although but recently put on the market, a great number of these ingenious regulators have been

As before stated, great success has attended the use of this gear, and we anticipate a very extended demand for it, considering the circumstances now attending the demand for boilers of such great pressures and powers, with freedom from risks of any kind that may possibly be avoided. The gear is adapted for use in any type of boiler, it being fitted to the marine type in the *Blake*, the loco-marine in the *Halcyon*, and to two other types of water-tube boilers, besides the Thornycroft, for which it was originally designed. To describe mechanically the gear itself:—

First we have the cast gunmetal lever A, the solid drawn steel float B, B being pivoted at one end and the balance weight C at the other, the lever is supported on the fulcrum D, which can be raised and lowered by the controlling gear outside the boiler, D being one arm of the bell crank E; when the fulcrum has been fixed in the desired position the float acting on the lever, works the feed valve through the toggle, F, which is fitted with a ball and socket joint at each end, so that the valve itself has no chance of being jammed. The controlling gear on the boiler front consists of a bracket which forms a gland for the rod, which by being drawn out or pushed in raises and lowers the fulcrum of the lever. The screw which

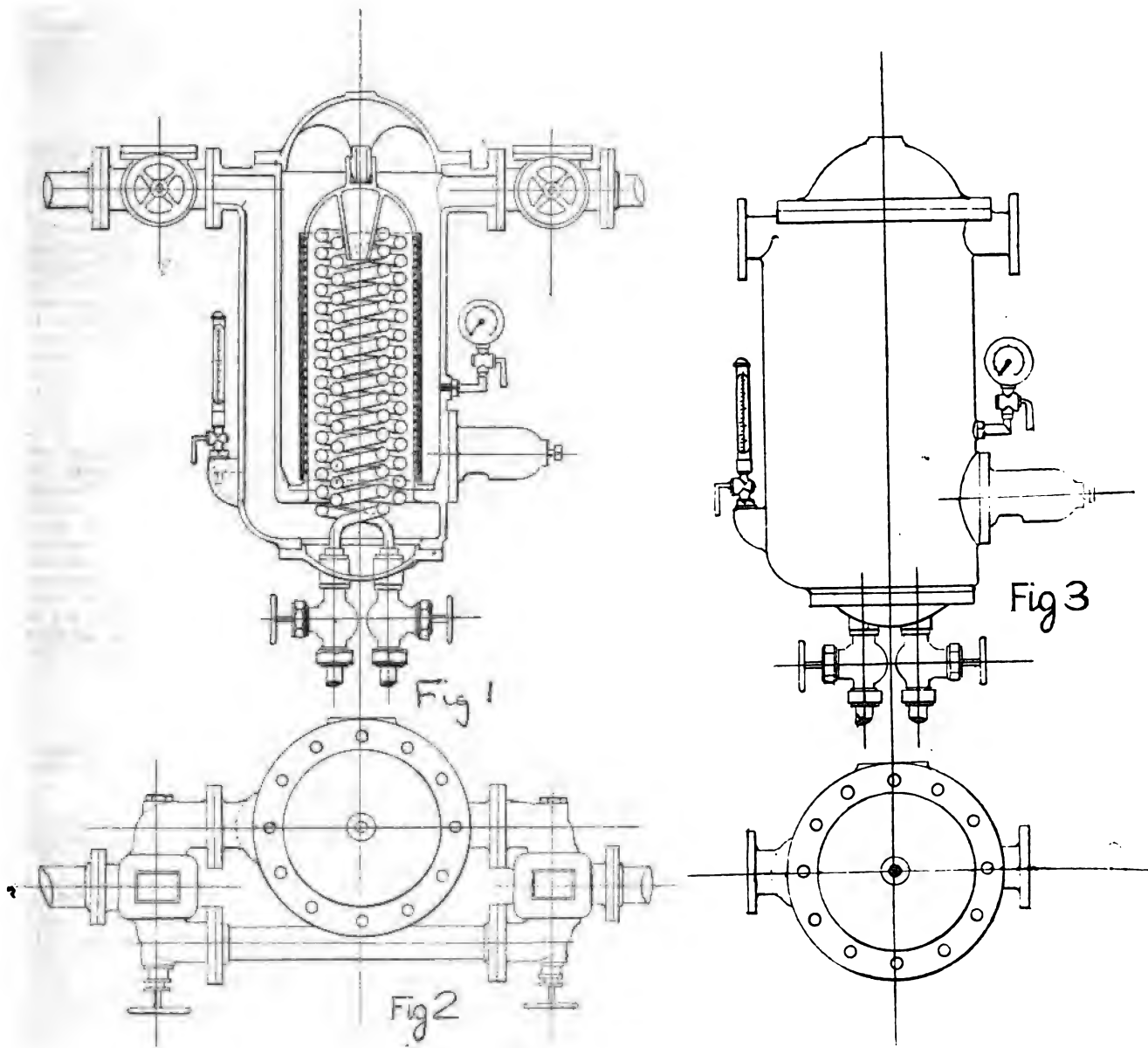


works this rod also works an index showing the position of the fulcrum, thus showing the height of water in the boiler at which the gear is set to shut off the feed.

It will be noted that the float itself works the feed valve without the intermediate mechanism working

### WEBSTER'S COMBINED FILTER AND FEED-HEATER.

THE high-pressure steam now being generally used in marine boilers necessitates separate and especially designed filters and feed-heaters for the



WEBSTER'S COMBINED FILTER AND FEED-HEATER.

through any stuffing glands, the one gland through which the controlling rod passes only coming into use when the gear is being adjusted by hand, and thus does not at any time affect by friction the working of the gear. This is a new and important feature in this gear, which has made its working universally satisfactory.

purpose of extracting the grease and other impurities from the feed-water before it passes into the boilers.

This has, therefore, proved a new departure in the construction of boiler accessories, which has called forth much ingenuity amongst marine engineers.

We have pleasure in illustrating herewith an arrangement for this purpose that strikes us as being a most

convenient and compact combination of both feed-heater and filter in one domed vessel.

From the section shown in Fig. 1 it will be seen that the feed-heater, in the form of a double convoluted steam tube, is inserted from below into the cylindrical chamber, and is surrounded by a cylindrical filtering surface of very large area in the form of a filtering tissue or fabric surrounding a perforated inner chamber containing the spiral heating tubes. The feed-water is admitted by a side branch to the external chamber thence through the filtering medium to the inner chamber, where it comes in contact with the heating tubes and thence is taken to the boiler both filtered and duly heated to any required temperature. The inner filtering chamber and surrounding medium can be very conveniently lifted and removed from the top cover of the outer chamber for the purposes of cleansing and renewal, leaving the heating tubes untouched if they do not require attention. There are the usual accessories of pressure gauge and thermometer, and the very necessary bye-pass between the feed inlet and outlet, so that the feed may be continued, without interruption, direct, when the filter is open for cleansing.

There is naturally no new departure in the principles of construction of such a filter and feed-heater, but the advantages to be looked for are those of convenience in fitting, handling, and easy access to all parts for cleansing or renewal.

The combination of the heater and filter in one structure must make considerable economy in pipes, connections and erecting as compared with separate filtering and feed-heating appliances, and as the bye-pass answers for both appliances whilst the outer casing is common to both, and there are no pipes between filter and feed-heater, the first cost of such a combined arrangement must be much less than that for the two articles separate.

This appliance is being supplied by Mr. Albert Webster, of 6, Tower Chambers, Water Street, Liverpool, to whom we are indebted for an opportunity of submitting a very simple and neatly designed appliance to our readers.

## NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondent.)

THE mobilisation was carried out with scarcely any of those hitches which have been so lamentable a feature of this annual business in the past. At Portsmouth six cruisers went out of harbour the day they were commissioned, and the torpedo flotilla only met with one accident, the collision of the destroyer *Dasher* with a dredger. In one way this incident proved to be of use, for it showed that the collision bulkhead of these small craft is sufficiently strong to keep them afloat. At Devonport, the Spanish squadron, which still remained in port, rather occupied the attention of officers who would otherwise be employed mobilising; but the work progressed all the same, and in very good time the various vessels were got out of harbour. At Chatham everything was in readiness when the order arrived, there was no delay or disorder, and the crews were all on board the named vessels before the pennants were hoisted. The same day all the ships left the basin, the smaller vessels going down the river that afternoon, and the larger the following morning. Of the vessels which broke down, the *Rocket* torpedo-boat destroyer, at Devonport, developed leaks in her boilers. No. 83 torpedo boat had a defect in her crosshead brasses. The *Speedwell* gunboat showed leaks in the flanges of her high-pressure

piston. The *Ferret* torpedo-boat destroyer developed defects in her automatic feed gear. The *Dragon* torpedo-boat destroyer reported her safety valves leaking. No. 73 torpedo boat ran aground as she was coming in from the Sound and damaged her propeller. The *Melampus* cruiser and *Renard* gunboat also showed defects needing dockyard attention, and the *Contest* torpedo-boat destroyer, which was commissioned to replace the *Dasher*, was also in trouble with leaking tubes after her trial. But, after all, one of the chief purposes of the mobilisation is the discovery of these defects and the trial of the new material of war under conditions resembling in a measure those of actual war—it would be strange then if none occurred at all. More to the purpose it is to note that in the majority of instances it was the newer ships in which small mishaps occurred, showing that when officers and men became more accustomed to them these will probably disappear, if not altogether, in great part.

### The Tactical Exercises.

It is generally acknowledged that the manœuvres of this year, or as they are officially termed, "tactical exercises," do not fall far short in respect of their educational value of the standard previously maintained. There was, at all events in connection with the two principal fleets, no mimic warfare, but there was in place of the strategical problems which have been so interesting and exciting in years past, a multiplicity of drills and exercises for the benefit of the men; tactics, both simple and complex, for the instruction of the officers generally, and a very pretty little question of scouting for the solution of the Admirals. It was the latter which promised the only bit of excitement connected with the manœuvres, but owing to unexpected circumstances even this failed to provide any startling event, and all that can be said is that the educational value of the exercises was fully demonstrated. After a preliminary cruise the two fleets anchored, the one in Lough Swilly, and the other in Bantry Bay. From these places they started for destinations unknown to one another, arriving at which they began a search for the purpose of effecting a junction within six days. In less than six hours they found one another, which, if it proved the excellence of their scouting arrangements, was also a little disappointing. As a matter of fact, although the places to which the fleets were sent were severally three hundred miles from their ports of departure, they were only one hundred miles apart. This short distance might conceivably have caused the two fleets to miss had either been later than the other in arriving at its rendezvous, but as they both arrived about the same time, and both threw out their scouts almost simultaneously, it was not many hours before they came together. The alternative methods of scouting employed by the Admirals provided, however, valuable lessons to all engaged, and after the junction some useful tactics were carried out. The period of manœuvres terminated with artillery practice at targets, in which the shooting was considered by experts to be considerably above the average in ships only newly commissioned.

### Portsmouth Dockyard.

It is hoped that with the change in the Government there will be renewed naval activity in the Dockyards. Not that the *Majestic* and *Prince George* are not being pushed on at a fairly rapid rate, but the *Cæsar* is a long way behindhand, and has, indeed, for some time made no progress at all. Then the first-class cruiser *Eclipse*, which was put into dock more than 12 months back, to be copper sheathed, has not been completed, and now another big cruiser is to be laid down on the slip from which the *Prince George* took the water. If these vessels are to be finished in record time, more money must be spent on them and more men employed. Here, also, suggestions have been made to light the yard with electricity, but so far this has not been done because the 2s. a 1,000 ft. charged by the gas company is a much cheaper rate than any electric lighting plant would be. I do not fancy I have noted it before, but the material for the *Gladiator* cruiser, which is to be begun directly after Christmas, is being delivered at the yard in large quantities, and this vessel, when commenced, bids fair to add to our record in construction. The four 12-in. wire guns for the *Majestic* have been delivered, so that it is hoped that the trials of this ship will take place early in September. The new docks are now growing perceptibly, and the granite blocks for the masonry are being put in position as rapidly as they arrive from Cornwall. Perhaps the most important incident connected with this yard last month was the accident on board the *Charger* torpedo-boat destroyer. This vessel had been out for a trial spin with their Royal Highnesses the Prince of Wales

and the Duke of York, and on her return the illustrious visitors had not long disembarked when it was discovered that the crown of one of the furnaces was cracked right across. This must have happened after the vessel came alongside this yard, for if the crack had taken place when she was steaming the boiler must have burst and a terrible disaster happened. The rest of the *Inflexible*, promised a long while back, is now timed to take place in October or November, when her crew will be transferred to the *Nelson*.

#### Alteration in Pay of Engineers, R.N.

An order in Council, dealing with the pay of naval engineers, has just been promulgated, and has not been received with any great amount of satisfaction. It will be remembered that a promise to the effect that something of the kind would be done was made some time back in the First Lord's Memorandum, issued with the Navy Estimates, but it was hoped that a real attempt to bring the pay of this important branch up to a level with that of the officers of the civil departments, whereas it is now found that there is little on no foundation for this natural aspiration. A chief inspector of machinery will now receive two pounds a day, which is less by fifteen shillings a day than the pay of an inspector of hospitals, whose responsibility is in no sense greater, and by two shillings a day than that of a deputy inspector of hospitals, whose position can scarcely be considered equal, whatever his duty may be. A fleet engineer, after 14 years' senior service, will now receive twenty-six shillings a day, or seven shillings less than a fleet surgeon or fleet paymaster. This kind of boon can scarcely be called placing "the higher ranks of engineer officers more upon an equality with the senior officers of the other civil branches of the Navy." Junior service is now allowed to reckon; under twelve years' service in the junior ranks, *viz.* above twelve years' service, one-third of the period in excess of twelve years. The half-pay of chief inspectors is raised to twenty-four shillings a day, and that of inspectors of machinery to twenty-two shillings. The maximum a fleet engineer can obtain is eighteen shillings. Some alteration has also been made in the maximum retirement, but as a fleet surgeon can still get a retirement amounting to £47 10s. more than a chief inspector of machinery, it is obvious that this state of things cannot be considered satisfactory. No officer below the grade of chief engineer is affected.

#### The Torpedo-Boat Manœuvres.

These operations were framed with a view to test the uses and value of the new torpedo-boat destroyers. They have amply demonstrated that this is a largely overrated war machine. It was claimed by the naval authorities that these vessels would ring the death-knell of the torpedo-boat. Other people said that they were to put an end to the battleship. The manœuvres have shown that they will do neither. This is not a state of things the Admiralty were anxious to have known, and it was therefore decreed that no newspaper correspondents should accompany the squadrons engaged in the operations. But naval officers and seamen and stokers are only human, and now they have returned sufficient information has been obtained to enable professional men to draw a very fair estimate of the value of the destroyer. First of all ten per cent. of the boats engaged were disabled, another ten per cent. were unable to play an effective part for want of water at the right time, for the water-tube boiler, although a success and far superior to the locomotive boiler, requires a good supply of fresh water or they prime, lose speed, and become inefficient. But the destroyers proved themselves better sea boats than the torpedo boats, and more capable of maintaining speed in a sea way.

#### Devonport Dockyard.

"Light, more light!" is the cry at this establishment, where recently more than one accident has occurred owing to the insufficiency of illumination in the yard. Some day, perhaps, all the Government works will be effectively lighted with electricity, but this cannot be truly said at the present time. The *Sirius* paid off here, and is to be prepared for further service. She made a very good trial before paying off, getting a speed of 18.2 knots per hour, but her boilers need considerable overhauling. The cruisers *Arrogant* and *Furious* have not progressed in their construction quite so fast as was anticipated, owing to delay in the supply of material from the contractors, but fresh consignments have enabled the authorities to put more men on the job, so that it is expected that the lost time will yet be made up. A well-deserved compliment has been paid to Keyham for the expeditious manner in which the defects connected with

mobilisation were made good. The *Melampus* cruiser, *Renard*, gunboat, *Rockst*, *Contest*, *Dragon*, and *Ferret* torpedo-boat destroyers, as well as two torpedo-boats, developed defects; but by working day and night shifts and on Sunday, all these vessels were enabled in the shortest possible time to rejoin their squadrons. The *Blanche*, cruiser, is now ready for hoisting the pennant, and it appears likely that she may relieve the *Blonde* on the West Coast of Africa station, although it has also been stated that she will be sent out with a relief crew. She has been transferred to the A division of the Fleet Reserve. The *Northampton*, training-ship for novices, has arrived here to have a patch put on one of her boilers. A new phosphor bronze high-pressure piston ring is to be made for the *Bendow*, and there is work to be done on the *Melampus*, *Halcyon*, *Hasard* and other vessels. In October, the *Cleopatra*, cruiser, will return here from the West Indies to pay-off and recommission. A few necessary repairs will be effected here, and then, as in the case of the *Tourmaline*, an extensive refit will be carried out at Bermuda. The *Phæbe* will be recommissioned at the Cape in December, her new crew sailing from this port in the *Pearl*.

#### Water-tube Boilers.

In order to gain further experience with the water-tube boilers the naval authorities have determined to fit them in two more gunboats of the *Sharpshooter* type, the wet-bottomed locomotive boilers originally provided for these vessels being taken out to allow of the others replacing them. At present three gunboats only are fitted with water-tube boilers, those in the *Sharpshooter*, which has been running a series of very successful trials, being of the Belleville type, those in the *Spanker* of the Dutemple type, and those in the *Speedy*, also a great success, of the Thornycroft type. What types will be fitted in the two gunboats now to be taken in hand has not yet been made public, but it is supposed that they will be of British design and manufacture. The two gunboats which it is at present decided to fit in this way are the *Spider* at Devonport and the *Speedwell* at Chatham, the former of these vessels being that now used for the instruction of engineer students at Keyham. The *Sharpshooter's* trials have not been completed without a breakdown, but the nature of this is not very clear, and whether it is concerned with the principle of the boilers or not is undetermined. The *Spanker*, which is fitted with Dutemple boilers, is to carry out a similar series of trials to those to which the *Sharpshooter* has been subjected, but as hitherto each tentative trial has come to a premature termination, owing either to leaky tubes or over-heating of engine bearings, it cannot be said that success is assured. These preliminary tests are for the purpose of ascertaining:—the amount of water evaporated for each square foot of grate surface; the amount of coal required for each I.H.P.; and the amount of coal consumed for each square foot of grate surface. The firm responsible for the design and manufacture of the boilers will be represented at the trials, as well as the British Admiralty, and a comparison which the experts will be enabled to draw between the results and those of the *Sharpshooter* and *Speedy* trials cannot fail to be most important and instructive.

#### Sheerness Dockyard.

The contract for the machinery of the 3rd class cruiser *Pelorus* building here has been given to Messrs. Thomson, of Clydebank. These will be of 7,000 H.P., and the speed with natural draught of this 2,000-ton ship will be 20 knots, which is more than has yet been realised in any ship of the class. The *Comus*, *Champion*, and *Egeria* are here in the yard hands, while the *Torch* and *Alert* are all but finished, so that before long it is expected that there will be more for us to do. The *Comus* made a machinery trial when the engines indicated 1,922.2 H.P., and the ship attained a speed of 12 knots. She was to have had her magazines shifted from their present position amidships to other places in the fore-and-aft portions of the vessel, as was done in the *Cordelia*, but this project has been since abandoned. Since the mobilisation the harbour has been practically deserted; but the conclusion of the manœuvres has brought many ships back again, and the river has been lively enough during the last days of August. The *Pelorus* is to be fitted with tubes for the discharge of 18-inch torpedoes, but it is not stated if one of these will be put in the stern. Many naval officers are of opinion that the most useful torpedo tube will be that in the stern, for in the event of a vessel attempting to ram and making a miss she ought certainly to be sunk with the stern torpedo of the ship she attempted to run down. The *Trent* and *Bustard*, harbour vessels, are in the dockyard for their annual refit, this time of the year, when the gunnery schools are closed, being the best for this work, as th-

services of these vessels are not then required. The contractor for the shore foundations of the boom to protect the ships in the river against torpedo boat attacks, has completed his share of the work, and it has been officially reported to be satisfactory. The *Grafton*, late of the Medway Reserve, is to be commissioned at Portsmouth on September 10th, to carry out a new crew to the *Camperdown* in the Mediterranean.

#### Coal Consumption.

There is scarcely any feature in connection with improved engineering capacity of our men-of-war which is so clearly indicated by figures as the improvement which has taken place in connection with fuel. This is not to say that the coal is so much better than was formerly the case, but now-a-days so much less is required to get the same result. Thirty years ago a first-class battleship needed 5 lbs. of coal at least for each I.H.P., while now in the *Majestic* class only half that quantity is needed. At that time such a ship probably carried about 750 tons of coals, and could only steam ten knots an hour for six days. But ships of the *Camperdown* class carry 1,800 tons, giving a distance of 8,500 miles at 10 knot speed. The *Royal Sovereign*, with 900 tons, can steam 5,000 miles, and as she can on a pinch carry more than this quantity, by so much more is her radius of action increased. The *Majestic*, with her advantage over the old coal-eaters, is still more superior in this respect, and when we get battleships with water-tube boilers, we may expect to see better results still. Speed is undoubtedly a fine quality in all ships, but coal or fuel is their life-blood, and the efficiency of a ship largely depends on the use she can make of her supply.

#### Our supply of Seamen.

We hear a great deal at different times about the dearth of seamen for the Navy, and the straits the authorities are put to to find sufficient men; but the manœuvres do not seem to have made any demands this year upon our resources, although the number of ships commissioned does not fall very short of that which is the average for the last ten years. At every port there was a surplus of men and officers, but especially large were the balances of men left over after the calls of mobilisation. At Devonport, the number left in barracks created quite a surprise at that port when it was made public; at Chatham, although upwards of 2,000 men were wanted for the ships, more than 1,500 remained behind; and at Portsmouth, after all the ships had gone, there were still over 2,500 in the depot alone. Sheerness, too, which has generally been called upon for six or seven hundred men, only on this occasion sent 250. Nor does this calculation take into consideration the large number of marines which remained in barracks at each of the three ports. This statement does not show that it is unnecessary to increase the Naval establishments, far from it; but it proves that without unduly straining our resources in this respect, we can put large and strong fleets to sea. The actual numbers of lower deck ratings, as shown in the Navy Estimates, are at present:—Petty officers, seamen and stokers on the active service list, 51,726, and those are distributed as follows:—Ships on active service, 26,127; coastguard ships and tenders, 2,681; gunnery, torpedo and training ships, 2,760; stationary ships, 3,936; surveying ships, 449; Indian troopships, 219; store ships, 223; drill ships, 155; Fleet and Dockyard Reserve ships, 16,179. That a very large proportion, indeed some may think far too large a proportion, are employed in service which is almost altogether on land or in harbour only, is not a good feature of this classification; but there is an increase of nearly 4,000 since this time last year.

#### Chatham Dockyard.

Here as elsewhere the full strength of the establishment was not drawn upon for the mobilisation, but so far as our readiness for war was tested, the Medway Fleet Reserve answered to the call in a satisfactory manner. Orders have been given for the cruiser *Severn*, lately returned from China, to be brought forward for another term of foreign service, and her armament to be strengthened accordingly. The repair of the *Superb* is also to be taken in hand, and as the machinery of the *Minerva* is now complete, this will employ some of the workmen in the engineering department. The *Blake* is also being renovated both as to boilers, which are to be fitted with special tubes, and as to armament. The *Magnificent* has been completed for trial in less than two and a half years from laying the keel-plate, a record for this yard. But the *Minerva* does not progress so speedily as was at one time anticipated would be the case. The refit of the *Sanepariel*, guard ship at Sheerness, is being pushed forward, and she will be completed by next month. She is to have her 6-in. guns replaced by quick-firers of similar calibre. The *Tyne*

is to be altered here to serve as a store-ship in the Mediterranean in place of the *Humber*, which vessel has been ordered on to China. The *Victorious* will, it is expected, be ready for launching in October, and the *Illustrious* is partially framed and plated, although she has not yet been five months in hand. Of the torpedo-boats sent from this yard to Gibraltar, No. 88 strained the rivets in her fore compartment in the heavy seas encountered in the Bay, and was hauled up on a slip at Ferrol, and repaired there before proceeding to her destination. Rear-Admiral H. G. Andoe, O.B., has been nominated as the successor of Vice-Admiral Morant, when the latter relinquishes the post of Superintendent of Chatham yard, on the 1st of September. In the engineering shops here this is plenty of work in hand, for we have the engines for the cruiser *Vindictive*, of 9,600 H.P., to give 20 knots; the torpedo tubes for the battleships *Illustrious* and *Victorious*, and the repair of the machinery of the *Blake* and *Sanepariel*. New boilers are also to be supplied to the *Dreadnought*.

#### Shipbuilding by Contract.

The private shipbuilders are looking forward with some anxiety to the issue of tenders for the cruisers and destroyers promised in the last Estimates. There were three first-class cruisers which Lord Spencer said were to be put out to contract, and there are several torpedo-boat destroyers still to be placed. The cruisers have already been described in these columns, and it is known that they are to be called the *Diadem*, *Europa* and *Niobe*, but who will get the contract is still uncertain. The tender of Earle's Shipbuilding Co., at Hull, has been accepted for the boilers and engines of the cruisers *Arrogant* and *Furious*, which vessels are being built at Devonport, and Messrs. Thomson, of Clydebank, are to build the machinery of the *Pelorus*, which is under construction at Sheerness. The former will be of 10,000 H.P. to give a speed of 18.5 to 19 knots, those of the latter of 7,000 H.P. to give a speed of 20 knots. A sister ship to the *Pelorus*, to be called the *Proserpine*, will be put in hand at Devonport. The cruisers *Powerful* and *Terrible*, building by contract, are making rapid progress, indeed in the case of the latter ship it cannot be very late in 1896 before she is ready. The propelling engines are already in position, and she will soon be supplied with her boilers. The battleship *Jupiter* will, it is anticipated, be ready for launching not later than November. She, like the *Terrible*, is in the Clydebank yard, and this firm having completed three torpedo-boat destroyers have now taken a contract for four more 10 ft. longer and much faster. The Fairfield Co., on the Clyde, have three destroyers in hand called the *Handy*, *Hart* and *Hunter*, and two, the *Fervent* and *Zephyr*, are being built by Messrs. Hanna, Donald & Wilson, at Paisley. These latter are fitted with locomotive boilers.

#### The Launch of the "Prince George."

The new first-class battleship *Prince George* was launched from No. 5 slip in Portsmouth Dockyard, on Thursday, August 22nd, the christening ceremony usual on these occasions being performed by Her Royal Highness the Duchess of York. To witness the junction a very large concourse of spectators had assembled, for the *Prince George* will be the largest battleship yet built on a slip at Portsmouth Dockyard, and many difficulties connected with her length and height had to be surmounted. In attendance on the Duke and Duchess of York, who were guests of the the Naval Commander-in-Chief at Admiralty House, and on the Princess Louise, who was also present, there were at the launch Mr. Goschen (the First Lord of the Admiralty), Mr. Williamson (Director of Dockyards), Admiral Sir Nowell Salmon, V.C. and his staff, Rear-Admiral Faine (Admiral Superintendent of Portsmouth Dockyard), and General Davis (commanding the Southern military district) with his aides-de-camp, Captain Sumner and Captain Shawe-Taylor. The business of putting the ship into the water went off without a hitch, for everything had been well thought out and the weight of the ship was not quite so much as that of the *Trafalgar*, which had in her time been launched from this same slip. The *Prince George* was commenced on September 10th, 1894, so that eleven months have been already occupied in her construction, and she will hardly beat the record of some earlier vessels; for all that if her completion is taken in hand at once it may be possible to make up for lost time. She will now have her boilers hoisted on board, her upper works furnished, and go into dock to be armoured. The *Prince George* is a battleship of the *Majestic* and *Magnificent* class, and so far as at present arranged will be precisely similar to these vessels, which are now going through their trials, and will be armed in the same manner. She is likely to be a fine addition to the navy, and everyone will echo

the gracious words of the princess who christened her with her royal husband's name, "I wish success to the ship and all who sail in her."

#### Pembroke Dockyard.

Great efforts are being made here to get the *Renown* ready to despatch to Devonport early in November. Many hands have been taken off the *Hannibal* and transferred to the older ship in order that there may be no delay. At one time there must have been nearly 1,500 men employed on her. The harbour has been made lively by the calls of vessels engaged in the manoeuvres, the *Curlew*, *Landrail*, and *Seahorse* arriving first, and being followed by the cruisers *Hermione* and *Fos*, with 15 small craft. The training vessel *Northampton* has also been here beating up for recruits. The steering-gear of the *Renown* is to be duplicated. The *Hannibal* has so far progressed that a number of armour-plates are in position, and a great deal of the structural work in the interior of the ship is completed. The drawings of the new cruiser *Andromeda* have been received, and preparations for her construction are being vigorously pushed forward. I have frequently in these columns referred to the need of a second dock here, and therefore need make no apology for quoting what is said on this subject by a correspondent of the *Dockyard Record*, with every word of which I thoroughly agree:—"The naval manoeuvres should not be regarded merely as a test of the efficiency of naval officers in handling fleets, and the suitability of different types of vessels, but should also determine the fitness of Naval dockyard equipment in making good defects or injuries which, from the experience gained each year during the mobilisation, may be anticipated to occur in a tenfold degree in actual warfare. Proper equipment facilities do not exist at this port, as has been previously pointed out. The one dock has not been adequate to the requirements of the present manoeuvres. On Friday morning two torpedo boats were docked, and as the amount of repairs necessary to one of them was trifling, she was undocked next day. In the process of undocking her the remaining torpedo boat was floated, thus necessitating a great amount of extra work in again securing her on the blocks. This had hardly been accomplished, when a third torpedo boat arrived, and the water had to be re-admitted to dock her. The other torpedo boat was thereupon floated once more, and had to be secured in position on the blocks a third time. This, however, is only one aspect of the dock question. If a large ship had chanced to have been occupying the dock the Government would have been obliged to engage a private dock or the boats would have had to be sent elsewhere for repairs, which, in the case in question, would have entailed great risk and considerable expense.

### OBITUARY.

#### DEATH OF DR. PETER DENNY, LL.D.

OUR obituary this month contains the honoured name of Peter Denny, LL.D., the eminent shipbuilder, shipowner, engineer, and philanthropist, who died on the morning of Thursday, the 22nd ult., in his residence at Helenalee, Dumbarton, in the 74th year of his age. The origin of the illness which ultimately caused his death was a cold, contracted during a drive in London, where he had temporarily stopped on his way home from Nice, in April last. Other complications set in after his arrival home, causing him to be confined to the house. A temporary improvement in the condition of the patient revived hope for a little, but it was soon dispelled, and he gradually sank and passed peacefully away on the date stated. The Doctor was conscious up to within a few minutes of his demise, and in his closing moments was surrounded by all the members of his family with the exception of Mr. Archibald, who is at present on his way from Trieste.

Peter Denny was the sixth son of William Denny, one of the earliest and most esteemed steamboat builders on the Clyde, and was born at Dumbarton on the Hallowe'en of 1821. He was educated at the Grammar School of his native town, and at the age of 12 served as a clerk in the office of a local lawyer, subsequently transferring his services in the same capacity to the Dumbarton Glassworks Co., and to the Messrs. Cochran, flint glass manufacturers, Glasgow. This probationary period over, he, with his elder brothers, William and Alexander, began business in 1844 as iron shipbuilders at Dumbarton. A few years later the brothers assumed as a partner another brother, James, who had just returned from abroad, the firm taking the title of Denny Bros. In 1849 Alexander Denny withdrew from the firm and started as a shipbuilder and engineer in

the town in conjunction with his youngest brother, Archibald. At this date the original firm altered its title to William Denny & Bros. This title still remains, but with a totally different co-partnership, all the original members being now dead. In 1851, in conjunction with his brother-in-law, Mr. John M'Analand and Mr. James Tulloch, Mr. Denny started an engineering and boiler-making business, now known as Denny & Co. The Dennytown Forge Co. and the Levenbank Foundry also owed their formation to the same source. In 1867 the firm removed from the Woodyard to the ground on the north side of the river, which they still occupy, and is now known as Leven Shipyard. Throughout life Dr. Denny displayed an adaptive genius and creative power on all matters connected with the art of shipbuilding and maritime science. He was one of the first to turn his attention to the construction of iron screw steamers, and under his skilful management the business rapidly developed. He has built some of the largest and most famous fleets afloat; and there is scarcely a line of any importance by which his services were not at one time or other called into requisition. Vessels have been built by his firm for the Cunard Co., the Allan Line Co., the P. & O. Co.; but he was more largely interested in the British India Co. He was also a prominent member of the Irrawaddy Flotilla Co., Patrick Henderson & Co., Union Steamship Co. of New Zealand, and other important shipping concerns. In 1871, Mr. Denny was appointed by the Government a member of the Committee on Designs for Ships of War, and he was also one of the Royal Commissioners who, in 1873-74, inquired into the loss of life and property at sea. His extensive business relations with foreign Governments made him the recipient of various distinctions, of which may be mentioned the Order of "Isabella la Católica," from the ex-Queen of Spain; from the King of Portugal, that of "Jesu"; while King Leopold decorated him a "Chevalier of the Order of Leopold." He also received, a few years ago, the honorary degree of LL.D from the University of Glasgow.

In 1851 Mr. Denny was elected Provost of Dumbarton, and occupied that position for a period of three years. His interest in all matters pertaining to the success and social advancement of the inhabitants of his native town were ever of an untiring and praiseworthy character. Deserving societies of every kind had in him a "pillar" of support as well as enjoying at all times the benefit of his administrative advice. His generosity and benevolence were known and realised, not only in his own district, but in connection with every object throughout Scotland. Specially worthy of mention in regard to the management of the works with which Mr. Denny was most closely associated was the excellent feeling which throughout his career subsisted between him and the large army of workpeople whom he employed.

For many years it has been the practice in the Leven shipyard to award premiums annually to those men in any of the departments who introduced improvements either in their tools or their methods of working. In this way large sums of money have been expended, and the inventive faculties of the men have been stimulated. Towards the close of last year, Dr. Denny celebrated the jubilee of his firm. On the occasion the people of Dumbarton presented an illuminated address to the deceased, and to Mrs. Denny an embellished album, containing the names of the subscribers, as a souvenir of the occasion. To illustrate further the respect and esteem which the people of Dumbarton entertained for the now departed chief, arrangements are almost completed for the erection of a magnificent bronze statue, which will probably be placed in the magnificent park which Dr. Denny, in conjunction with Mr. John McMillan, another shipbuilder, presented to the town some time ago. Mr. Denny was a Free Churchman, and contributed liberally of his ample means to its various home and foreign schemes. In politics he was a Liberal until Mr. Gladstone brought in his Home Rule scheme, when he threw in his lot with the Liberal Unionists. The deceased is survived by Mrs. Denny and four sons and two daughters.

#### DEATH OF MR. CHARLES MITCHELL.

We regret to have to record the death, at the age of 76, of that eminent shipbuilder, Mr. Charles Mitchell, of the firm of Sir W. G. Armstrong, Mitchell & Co. Mr. Mitchell being on a visit to some friends in Northumberland, contracted a chill, which unfortunately proved fatal. The deceased gentleman was one of the pioneers of shipbuilding in the North of England, having founded the yard at Low Walker, with which his name was long identified, over 40 years ago. He was one of the most successful men of his time, and for his kindly and generous acts, will long be remembered, not only on the banks of the Tyne, but also in Aberdeen, his native city.



### NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from July 27th to August 24th, 1895:—

Andrews, R. W. B. (probationary), assistant engineer to the *Empress of India*, to date August 20th.  
 Apps, W. R., chief engineer to the *Bruiser*, to date June 25th.  
 Baker, E. F. (probationary), assistant engineer to the *Nile*, to date August 20th.  
 Bath, F. (probationary), assistant engineer to the *Skipjack*, to date August 20th.  
 Bell, Edwin, engineer to the *Salamander*, to date August 3rd.  
 Bolton, A. W., engineer to the *Pembroke*, additional, to date August 23rd.  
 Byrne, Albert D., assistant engineer, for temporary service to the *Magicienne*, to date August 20th.  
 Carter, E., assistant engineer, to rank of engineer in Her Majesty's fleet.  
 Charlton, Francis J., assistant engineer to the *Endymion*, to date August 20th.  
 Chater, F. A. (probationary), assistant engineer to the *Ramillies*, to date August 20th.  
 Chisman, E., assistant engineer, to rank of engineer in Her Majesty's fleet.  
 Crawford, W. R. (probationary), assistant engineer to the *Empress of India*, to date August 20th.  
 Orlington, G. E. A., assistant engineer, to rank of engineer in Her Majesty's fleet.  
 Dawe, Chas., fleet engineer to the *Vivid*, additional, to date August 22nd.  
 Denson, H. R. (probationary), assistant engineer to the *Blenheim*, to date August 20th.  
 Foster, E. M., temporary assistant engineer to the *Scout*, to date August 20th.  
 Galpin, J. E., engineer to the *Alato*, to date August 23rd.  
 George, Francis T., engineer to the *Shannon*, to date July 20th.  
 Graham, F. (probationary), assistant engineer to the *Hood*, to date August 20th.  
 Grant, A. E., assistant engineer, to rank of engineer in Her Majesty's fleet.  
 Grazebrook, R. H. (probationary), assistant engineer to the *Royal Sovereign*, to date August 20th.  
 Gregory, Chas. W., chief engineer to the *Vivid*, for service in Devonport Dockyard, to date August 8th.  
 Haggerty, G. A., engineer to the *Herrier*, to date August 3rd.  
 Hall, C. R., engineer to the *Active*, to date August 23rd.  
 Harris, E., fleet engineer to the *Conqueror*, to date July 26th.  
 Haves, J. E., assistant engineer, to rank of engineer in Her Majesty's fleet.  
 Hay, C. J., engineer to the *Australia*, to date August 14th.  
 Hewitt, John B., assistant engineer to the *Anson*, to date July 29th.  
 Highton, F. W., chief engineer to the *Wildfire*, additional, to date July 1st.  
 Hobbs, F. D., chief engineer to the *Phabe*, to date August 8th.  
 Hookey, Stephen, chief engineer to the *Sphinx*, to date August 3rd.  
 Holgate, G. S., assistant engineer, to rank of engineer in Her Majesty's fleet.  
 James, Chas. J., engineer to the *Howe*, to date August 3rd.  
 Johnson, H. H. (probationary), assistant engineer to the *Blenheim*, to date August 20th.  
 Jones, G. W., temporary assistant engineer to the *Camperdown*, to date August 20th.  
 Jury, R. B., temporary assistant engineer to the *Dryad*, to date August 20th.  
 Kempt, A. B. (probationary), assistant engineer to the *Sybilie*, to date August 20th.  
 Kerr, John, staff engineer to the *Rayleigh*, to date August 22nd.  
 Laird, Geo. F., fleet engineer to the *Inflexible*, to date July 26th.  
 Lakeman, W. B. (probationary), assistant engineer to the *Barfleur*, to date August 20th.  
 Laughrin, Henry, fleet engineer to the *Victory*, additional, to date July 26th.  
 Leahy, Wilton P., assistant engineer, to rank of acting engineer in Her Majesty's fleet.  
 Lemon, J. A., fleet engineer to the *Pembroke*, additional, to date July 26th.  
 Marshall, F. W., assistant engineer, to rank of acting engineer in Her Majesty's fleet.

Martell, P. D., engineer to the *Surprise*, to date August 20th.  
 McLaurin, J., assistant engineer, to rank of engineer in Her Majesty's fleet.  
 Moore, Chas. A., chief engineer to the *Medea*, to date August 3rd.  
 Morris, O. A., assistant engineer, to rank of engineer in Her Majesty's fleet.  
 O'Neill, John, engineer to the *Victory*, supernumerary, to date August 3rd.  
 Owen, J. A., temporary assistant engineer to the *Rodney*, to date August 20th.  
 Pendleton, T. B. (probationary), assistant engineer to the *Hawks*, to date August 20th.  
 Reid, R., engineer, to be senior engineer Royal Naval Reserve.  
 Richards, P. C., assistant engineer for temporary service to the *Speedy*, to date August 20th.  
 Sandeman, P. A., assistant engineer for temporary service to the *Rainbow*, to date August 20th.  
 Sanders, J. S. (probationary), assistant engineer to the *Anson*, to date August 20th.  
 Soreech, J. J., assistant engineer for temporary service to the *Haleyon*, to date August 20th.  
 Soullard, G. H. (probationary), assistant engineer to the *Bellona*, to date August 20th.  
 Silk, E. S., engineer to the *Vivid*, additional, to date July 24th.  
 Smith, E. C., temporary assistant engineer to the *Fearless*, to date August 20th.  
 Stainton, Geo. H., assistant engineer to the *Nardisus*, to date August 20th.  
 Stevens, J. G., engineer to the *Boadicea*, to date July 20th.  
 Stribling, W. S., staff engineer to the *Conqueror*, to date August 3rd.  
 Tucker, J. N. (probationary), assistant engineer to the *Royal Sovereign*, to date August 20th.  
 Wall, Lewis, engineer to the *Powerful*, to date August 23rd.  
 Wheeler, Percy, assistant engineer to the *Victory*, supernumerary, to date July 30th.  
 Whittaker, F. G., fleet engineer to the *Warepite*, to date August 22nd.  
 Wiggins, W. S., chief engineer to the *Heate*, to date August 3rd.

### HOAR & BROWN'S HARDWOOD MARKET REPORT, AUGUST 22nd. 1895.

TRAK.	Timber Loads.	Planks Loads.	Blocks Loads.	Total Loads.
Stock, 1st Aug.	4,714 ..	2,680 ..	47 ..	7,441
Landings	109 ..	100 ..	— ..	209
	4,823 ..	2,780 ..	47 ..	7,650
Deliveries	1,678 ..	218 ..	— ..	1,791
Stock, 16th Aug.	3,250 ..	2,562 ..	47 ..	5,859

Trade has not shown itself to be any more brisk than during the preceding month, although there is distinct improvement in the number of enquiries which have occurred. The Admiralty requirements, which are being selected daily, have had the effect of keeping stocks down.

A very marked feature is the large quantity of Bangkok timber which continues to arrive, showing the kindly feeling existing towards this comparatively new class of wood. Compared to Burmah imports, the prices obtained for the latter are now very little in advance of the Bangkok wood, and should the quality, &c., continue to improve there is no doubt that it may yet be seen to hold a leading position; that is providing new shippers do not step in and spoil the good average shipments of the last few years.

MAHOGANY.—Honduras wood is scarce; the small quantity now in first hands having been held for a rise will shortly be offered at public sale.

Good large Tobacco logs are required to fill up contracts already taken; the stock consists of a very poor selection of small to medium size logs.

Minatilan wood there is really no call for, unless it be of really extra quality for large wood, or a very low figure for small.

A fair business is being done in Panama, but stocks are reduced to low class stuff, and some sizeable sound importations are being looked for.

The already large stock of Cuba has lately been increased by the arrival of another cargo. Small wood is difficult to sell, but large logs are more or less in request.

African wood, large, has been going freely at fair prices, but inferior logs are not required.

**CEDAR.**—Prices are steady for ordinary classes and stocks are not over abundant, prime logs are still fetching fancy prices.

**WALNUT.**—Large logs of good quality are in fair demand at increased prices, but ordinary logs are selling at very low figures, some parcels changing hands at almost record values. Lumber of prime and middle qualities find ready purchasers at fair prices, but inferior parcels are very low in value.

**AMERICAN OAK.**—There is a poor demand for quartered and plain wood, and logs are not in request at all.

**WHITEWOOD.**—Lumber is being freely enquired for, especially the better quality. Logs have been arriving rather plentifully of late, but their poor condition and manufacture has caused a loss to the shippers.

**KAWIAE PINE.**—Shipments are being kept within a moderate compass, so that the wood maintains a fair price.

It is characteristic for the London trade to be at its lowest during August, but notwithstanding this fact, the month will bear favourable comparison with previous years.

## INDUSTRIAL AND TRADE NOTES.

### THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

THE wages question once more threatens to seriously affect the prosperity of the shipbuilding industry on the Clyde. During the month there has been an exceptionally large number of disputes, but happily so far with no more serious result than the loss of a few days' work on the workmen's part. It is difficult to understand why Clyde workmen seek to hamper Clyde builders in their struggle to get vessels to build, but it is much more difficult to understand why men who at existing rates can afford to lose many days work every fortnight, should be the first to expect an advance of wages. The more important questions are raised by the rivetters over the amended price-list recently drawn up by the masters, and by the engineers for a minimum wage of 7d. per hour. The rivetters' price-list has been a constant trouble. Beside it the most involved Act of Parliament is easy reading, and in its multiplicity of detail even a district delegate can lose himself. It contains a price for every job that could be thought of when the list was made, but unlike the others in England and Ireland it states that "these prices" apply to vessels up to 5,000 tons register. Beyond that tonnage, Clyde men two or three years ago demanded 5 and 7½ per cent. advance on certain jobs, and rather than have a strike the advance was granted with the result that every other builder of large craft on the Clyde had to follow suit. The increase was felt by the employers to be a serious handicap, not only because it put them at a serious disadvantage in competition with English firms, but because it opened up in an irregular, irritating way, the whole question as to what was in the list and what was not. To be brief, the masters have now done their best to improve matters by fixing prices for the work not covered by the list. An amended price list was presented to the men but was immediately returned with a demand for other increases and also the retention of the 5 and 7½ per cent. This the masters refused to do. And so the matter stands. The men refuse to entertain the new list at all, and the employers intimate that at the beginning of September the new list will be enforced.

In the matter of industrial activity a hopeful feeling still manifests itself. The amount of tonnage launched during the month has been considerable, and on the whole has been nearly all replaced by new tonnage. It is understood that several really good orders are in the market and it is anticipated that next month will bring about their realization. The Japanese Government have placed a couple of orders on the Clyde during the month, and as it is stated that they intend spending some of the indemnity immediately in the purchase of eight swift cruisers, four belted cruisers, twelve torpedo sloops and a flotilla of gunboats, it is quite probable that these are but the forerunners of

what may follow. Marine engineers on the Clyde and on the North-east Coast are extremely well supplied with work, more particularly on the Clyde, where some of the shops have more work on hand than they can well undertake. Steelmakers are well employed and are getting from 2s. 6d. to 5s. per ton over bottom prices for ship-plates, and many large contracts have lately been placed with the ironfounders in this district.

The Visitation Committee of Lloyd's Register of British and Foreign Shipping made their annual inspection of the shipbuilding yards, marine engine shops, &c., of the Clyde district in the early part of the month. The committee arrived in Glasgow on Wednesday the 7th ult., and on the following two days inspected the shipyards and engine shops of Govan, Partick, Clydebank and Whiteinch. On Saturday and Monday they visited Greenock and Port-Glasgow, and on Tuesday inspected Lloyd's proving-house for anchors and chain cables. The remaining two days of their visit was devoted to the shipbuilding and engineering works in Dumbarton and to the inspection of the new steel works of the Glasgow Iron and Steel Works Co., at Wishaw. The Committee expressed themselves highly satisfied with the general quality of work that came under their notice. They found a very large tonnage in course of construction at the various works, and were pleased to find the greater part of it under the special survey of their resident surveyors. The Committee, of which Mr. W. H. Tindall was the chairman, was accompanied by Mr. B. Martell, the chief surveyor; Mr. Stanbury, assistant to the chief surveyor; Mr. Milton, chief engineer surveyor; and Mr. Dryhurst, secretary. During the course of their visit to the Clyde they were also accompanied by Mr. Dodd, the principal surveyor of the Glasgow district and by the several members of the local staff.

Messrs. M. Paul & Co., Levenford Engine and Boiler Works, Dumbarton, exhibited in their works on Saturday, 17th ult., a new suction draught and smoke-preventing apparatus, intended for application to both marine and land boilers. The inventor of the apparatus, Mr. James Paterson, Glasgow, claims for it that it secures a greatly increased rate of combustion, while at the same time absolutely preventing smoke. At the test on the date mentioned this claim was justified in the presence of an interested company. The only times smoke appeared from the chimney were when the furnace was getting raked out or coaled. The rush of cold air then caused the smoke to appear, but it was of a milky-white colour and entirely eliminated from ashes and smut. At other times the chimney was perfectly free from smoke, it being entirely annihilated. A brief description of the apparatus may be interesting and not out of place here. A centrifugal fan is fitted close to the uptake of the boiler and draws the hot gases from the uptake. A stream of water is introduced into the fan centre and sprayed out from it through a series of tubes among the fan vanes, flowing out through the bottom of the fan case into a receiver, where the solid particles are retained by the water while the gases pass off to the chimney or funnel. In other systems of suction draught the fan is liable to damage from the excessive heat, but in this instance the spray keeps the fan in good working order, and also reduces to a great extent the temperature and volume of the gases passing through. This latter is a most important factor, as reduction in volume means a reduction of the size of fans for a given coal consumption, and in steamers where space and weight are of the utmost importance this is a vital point. Owing to the increased draught produced by the fan, air at sufficient velocity and in sufficient volume is mixed with the gases after they pass off from the furnace to ensure complete combustion, and instead of black smoke passing through the tubes or flues, the ignited gases at a white heat pass through and greatly increase the evaporative performance of the boiler. The boiler production is therefore increased at a compound rate, for a larger amount of coal is burned on a given grate and the ignition of the gases make a better use of the larger quantity of coal. The ignition of the gases is further the chief factor in preventing the formation of smoke. No test has yet been made of its evaporative performances, as the ignition of gases only takes place in the smoke box after they have left the boiler, but a drum boiler is being introduced between the present boiler and fan to absorb the heat produced, and when this is done exhaustive tests are to be made by Professor Barr, of Glasgow University. The rate of combustion ranged from 87 lbs. to 70 lbs. of coal per square foot of grate per hour, the latter being about three and a-half times that obtained with natural draught with a fairly high chimney. Even at this rate of combustion, with a temperature at the fan inlet exceeding 850

degrees, the fan casing remains so cool that the hand can be laid on it without inconvenience, and the temperature of gases entering the chimney is about 150 degrees F. Further, the boiler upon which the tests have been made has been working at these high rates of combustion for three months, and during that period there has not been a tool near it except a tube brush. This advantage in the prevention of damage to the boiler, which is caused by equal rates of combustion with forced draught, is generally admitted to be peculiar to suction draught, though the cause is not clearly explained. For marine purposes the peculiar advantages of the system are the entire prevention of the ashes and smuts ejected from the funnels with forced draught, and an increased output per ton or per cubic foot of boiler and fittings, without the damage resulting either to fans or boilers from other systems of suction or forced draught, and a large reduction in weight of and space occupied by fans and accessories as compared with other systems of suction draught. Another advantage this system has, so far as marine work is concerned, is the volume of fresh air that will be available for stokers, and the clean and pleasant conditions under which they will be able to carry on their work in comparison with the close stokeholes or force-draught system presently in use.

Messrs. A. & J. Inglis, Pointhouse Shipyard, secured an order about mid-month from Messrs. Burns to build a duplicate of the steam ship *Spaniel*, which has proved so popular in the Glasgow and Liverpool trade. The new vessel will be employed along with the *Spaniel* in the same service.

Messrs. R. Napier & Sons, shipbuilders, Govan, contracted early in the month with Messrs. Glen & Co., steamship owners and brokers, 107, St. Vincent Street, Glasgow, to build a cargo steamer to carry 2,650 tons on a very light draught of water. The steamer will be fitted with all the latest improvements for general cargo purposes and will be specially suitable for the grain and timber trades. Later on in the month the same firm secured an order to build a steel screw steamer of 2,500 tons, also for local owners. The engines and boilers of this vessel will be supplied by Messrs. Dunsmuir & Jackson, Govan.

Messrs. Lobnitz & Co., shipbuilders, Renfrew, secured an order towards the middle of the month from the Japanese Government, through Mr. A. R. Brown, the Japanese Consul, to construct a large twin-screw ocean-going telegraph steamer, completely equipped for laying, picking-up, and repairing telegraph cables. It is believed that this is the first of the orders which it is understood that the Japanese Government contemplate placing in this country.

Messrs. William Simons & Co., Renfrew, received instructions from the Crown Agents for the Colonies about mid-month to build a large and powerful hopper dredger for Colombo, Ceylon. The same firm also contracted to build a tug steamer for the same port.

Messrs. William Hamilton & Co., Port-Glasgow, contracted early in the month to build a fast passenger steamer for China waters. The engines for this vessel will be supplied by Messrs. Hutson & Son, Kelvinside Engine Works, Glasgow.

Messrs. Russell & Co. have now completed their building operations in their Greenock yard by the launching of two steel barges of 200 tons each for the Greenock Stevedore Co. The firm will henceforth confine their shipbuilding to the large yard at Port-Glasgow, and the yard vacated has been taken over by a new firm—Messrs. Carmichael, Maclean & Co. About mid-month Messrs. Russell booked an order from Messrs. Wm. Walker & Co., Greenock, to build a sailing ship of 2,400 tons carrying capacity, to replace the *Cumbras*, lost recently with all hands on the passage from Sydney, N.S.W., to Valparaiso. Messrs. Russell & Co. likewise secured during the month the contract to build two saloon passenger steamers for passenger and cargo service on the river Amazon. One of the vessels is being engined by Messrs. Rankine & Blackmore, Greenock, and the engines of the other will be supplied by Messrs. Kincaid & Co., Greenock. The two keels will be laid down on the berth vacated by the steamer *Langbank*, launched on the 23rd ult. This vessel is one of the largest carrying steamers ever launched at Port-Glasgow, her deadweight carrying capacity being 7,100 tons, of 3,050 tons net, and 4,640 tons register. The vessel is to the order of Messrs. G. M. Steeves & Co., Liverpool.

Messrs. Rankine & Blackmore, Eagle Foundry, Greenock, booked an order towards the beginning of the month, through Messrs. Morton & Williamson, naval architects, Glasgow, to build a powerful twin-screw steamer with overlapping propeller for trading and towing purposes in foreign waters. The hull has been

sub-contracted to Messrs. Robert Duncan & Co., Limited, Port-Glasgow. The engines will be supplied by the contractors of the vessel, on their well-known patent disconnecting triple-expansion principle.

Messrs. Kincaid & Co., Clyde Foundry, Greenock, contracted early in the month to erect two sets of engines of 1,000 I.H.P. each, for two steamers of 4,000 tons each, in course of construction at present in the yard of the Campbelltown Shipbuilding Co., for the Campbelltown Steamship Co. Messrs. Kincaid also secured the contract to engine one of the two large passenger steamers about to be laid down by Messrs. Russell & Co., Port-Glasgow.

Messrs. Caird & Co., shipbuilders and engineers, Greenock, early in the month contracted with the Pacific Steam Navigation Co., Liverpool, to build a steamer of 8,000 tons register. The vessel is to be engaged in the passenger service on the West Coast of South America. The Pacific Co., it may be here noted, at present owns 89 steamers with an aggregate of 71,289 tons register.

Messrs. The Ailsa Shipbuilding Co., Limited, Troon, have only three new orders on hand, but are otherwise being kept fairly busy with graving dock work. A large sailing-ship building for a Glasgow firm is in frames, and the other boats about to be laid down are a couple of steam yachts from designs by Mr. G. L. Watson. One of them will be built in the same covered berth as the *Zara*, which the firm constructed for Mr. Coats, of Paisley, in the spring of the year.

Messrs. Gourlay Brothers, shipbuilders, Dundee, secured a contract about the end of the month to build two saloon steamers for passenger and cargo service on the river Amazon. Four vessels in all have been given out, the other two having been placed on the Clyde.

The Patent Weldless Steel Chain and Cable Co. have purchased the works of the Lanarkshire Chain and Anchor Co., Gartsherrie. New plant is being laid down.

## TRADE NOTES FROM THE TYNE, WEAR, TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

### THE TYNE.

**Shipbuilding.**—The long looked-for revival in shipbuilding has not yet presented itself in this district—not at all events in any marked degree—though it is undeniable that the volume of work in hand, as compared with the beginning of the year, is somewhat augmented. Had it not been for inopportune speculation last year and the year previous, which resulted in the ordering of a good many ships that were not actually wanted, the genuine revival in business for which so many are anxiously hoping, might have been within measurable distance now. The building of vessels "on spec," however, has necessarily had the effect of putting off the time when the scarcity of tonnage shall be such as to render a general and urgent demand for new ships inevitable. One hopeful feature in the situation—locally considered—is that there are practically no boats of modern build laid idle, and in this connection it is also of importance to know that prices in the iron and steel trades are tending upwards, which, of course, is indicative of improving demand, a state of matters which also appears to be present in other countries.

It is now known that at least one of the large cruisers building at Messrs. Armstrong, Mitchell & Co.'s Elswick yard, is for a South American Government, and it is believed that one or two of the other vessels on the stocks are destined for the same quarter of the globe. Rapid progress is being made with the building of the Japanese battleship, and it is expected to be ready for putting into the water long before the time originally anticipated. The yard perhaps was never so busy as at this moment, and additional hands are being put on in the plating and rivetting departments daily. Night work is being resorted to at the frame furnaces, and there is even talk of a night shift being put on at the outside work, modern lighting accessories rendering this course now practicable. There is but a limited amount of work in progress at the company's Low Walker yard, the whole of the important orders for Russia having been cleared off the stocks some weeks ago. The *Dorothea Rickmers*, however, and another vessel which

it is understood, is unsold, are being fitted out on the river, and on these a good many hands are employed.

At Messrs. Dobson's yard considerable briskness is now apparent, there being five small steamers, which are ordered on Russian account, in progress, besides a large one for English owners. Business at Messrs. Wood & Skinner's yard has also much improved, the firm having a large vessel to build for local owners in addition to two smaller vessels mentioned in previous reports. It is understood that a considerable addition to the prospective work engagements of Messrs. Wigham Richardson & Co., has just been made, and that during the remainder of the year the yard is likely to be pretty busy. No particulars have transpired, excepting that an order has been placed with the firm by Messrs. Rickmers, of Bremen, for a vessel of exceptionally large tonnage, the machinery for which will also be supplied by them. The firm are fitting out beside the yard two very handsome vessels, launched during the past few weeks, namely, the s.s. *Lestris*, ordered by the Cork Steam Shipping Co., and the s.s. *Goldenfels*, ordered by the Hansa Co., of Bremen.

It is announced that the firm of Messrs. C. S. Swan & Hunter is to be formed into a limited liability company, and that Mr. John Price, late general manager of the Palmer Co.'s yard, and Mr. Denton, also of the Jarrow establishment, are to have a large interest in the business. Both these gentlemen are, as is well known, of large experience, and their addition to a firm that has already become distinguished as one of the most enterprising in the country can hardly fail to be productive of great results in the matter of future development. There are a large number of orders in hand at present, among which may be mentioned, a pontoon dock for a local ship repairing company, and the immense cargo boat *Westmeath*, ordered by Messrs. Hudson, of Sunderland, and now being fitted out in the river.

It may be mentioned that a sectional dispute which recently took place in the yard, was settled amicably and satisfactorily to all concerned, by one of the workmen, who—being personally unconnected with the dispute—was invited to arbitrate. This, we believe, is quite a unique incident, and we hope the good example set, may not be lost upon those whom it concerns.

Messrs. Hawthorn, Leslie & Co., launched a torpedo destroyer during the month—the second this year—and have now but one vessel of this type on the stocks. There are four other vessels in course of building, one of which—a large twin-screw steamer intended for the Russian Volunteer Fleet—is nearly ready for launching. The whole of the building berths at Messrs. Stephenson's yard are now empty, but it is hoped that this state of matters will not be continued for long. In the meantime a number of hands will be provided with employment in connection with the dock gate contract secured last month.

The Palmer Co. have four large vessels in early stages of construction at their Jarrow yard, and two berths are being cleared, it is supposed, for the reception of other keels. A report just to hand states that the torpedo destroyer *Janus*, which was built at the Jarrow yard, attained a speed of over 28 knots in a trial over the "Maplin" measured mile. This, it is stated, is the highest speed yet made by any vessel of this class, and as there was a marked absence of vibration, the result is highly creditable to the builders.

The Tyne Shipbuilding Co. have their berths fully occupied and are fitting out a splendid oil steamer ordered by Messrs. Hunting & Son, Newcastle, beside the quay. Messrs. Readhead are also having an abundance of work on the stocks, and are carrying out rather extensive repairs on a locally owned steamer.

There is a prospect that the Scotswood yard, which has now been closed for more than a year, will again be reopened by the Scotswood Shipbuilding Co., who still have their representative at the yard. The place has recently undergone a thorough repair, and the machinery having been carefully attended to and kept in working order during the period of the stoppage, a resumption of operations could be made at any time.

**Engineering.**—In marine engineering there is little change to note since last month; but there are more enquiries at locomotive works, and one or two small orders have been placed. Messrs. Emerson, Walker & Thompson Bros. have a good deal of windlass work in hand, and at Messrs. Carrick & Wardale's establishment, the demand for ships' pumps is well maintained.

Messrs. Noble & Lund, of the Northern Machine Tool Works, Felling-on-Tyne, have booked some important orders lately for Mudd's patent piston rings, of which speciality they are the sole licensees and manufacturers. This department of their works is

indeed very actively employed, though scarcely more so than the other departments, in most of which overtime is being resorted to.

Messrs. Wm. Hindson & Co., South Shore Road, Gateshead, have been very busy lately with hydraulic work for the Midlands as well as wrought-iron roofing, &c., for buildings now being erected in the immediate locality. They have also had several repair contracts in connection with small steamers' engines and boilers, a class of work for the execution of which they have excellent facilities.

Messrs. Wm. Emery & Co., brass founders, &c., have removed their business from Orchard Street, to larger and more suitable premises in Pottery Lane. The firm intend going in for the manufacture, on a large scale, of a new anti-friction metal, in which they have exclusive rights, and which is said to be both economical and effective. A speciality to which we referred last month—Anderson's patent equilibrium slide valve—deserves more than the passing notice then given. This is practically a new principle in the employment of steam power; the cylinder consisting of a plain tube which may be turned outside to ensure equal metal, thus preventing distortion through expansion. The cover contains two spaces, for exhaust, and for steam inlet, respectively, with a circular valve chamber having a separate port to each space. The valve is of sufficient width to cover both steam and exhaust ports while cutting off, and a motion either way opens one of the ports. The valve is a perfect balance, the pressure being all round and within, and has practically no friction. To sum up the advantages of this system, they are—simplicity of construction, economy of space, lightness of parts for valve motion, absence of clearance, and facility of access. We find that this system has so far only been tried experimentally, but it can be seen at any time under steam at the works of Mr. John Anderson (the patentee), Pottery Lane, Newcastle.

In the engineering department of Messrs. Ernest Scott & Mountain's works, Close, there are in hand main and auxiliary workshop engines for Her Majesty's ships *Hannibal* and *Illustrious*; fire and bilge pumps for the *Venus*, *Diana*, and *Mars*; and a considerable number of electrically driven ventilating fans for the *Venus*, *Diana*, *Juno*, *Doris*, and a Japanese cruiser. The firm have a number of ship lighting contracts in hand for Messrs. J. L. Thompson & Sons, Sunderland, and others. The firm are now erecting new buildings, which when completed will double the size of the works and the capacity for output. This extension had become necessary through the rapid development of the firm's business in recent years. Messrs. Wm. Bowran and Co., of 3, St. Nicholas Buildings, are experiencing a steadily increasing demand for that well-known antifriction metal, magnolia, and have, in the past eight months, more than doubled their sales as compared with the corresponding period of last year.

## THE WEAR.

**Shipbuilding.**—At the yard of Messrs. J. L. Thompson & Sons, the keels for two exceptionally large steamers ordered by Messrs. Rickmers, of Bremen, have just been laid, and frame turning is now being proceeded with. It is understood that the firm have other orders of importance, and there is reason to expect that the yard will be kept up to its usual standard of briskness during the autumn and winter months.

Mr. James Laing, who last month sold a large vessel to Italian owners, has sold another of equal dimensions this month, to English owners. The vessel is still on the stocks, but is being busily prepared for launching.

Messrs. Doxford have launched the s.s. *Oak Branch*, which is the first ship built on the turret design, and with "jaggle" plating, for Sunderland owners. It is now announced, that an order for a turret steamer has been placed with the firm by Spanish owners, and the circumstance furnishes another proof of the rapid progress the type is making in public favour. It is expected that another turret steamer (the sixteenth), and a torpedo destroyer will be launched from the yard next month. Messrs. John Blumer & Co. are putting down a very massive set of new plate bending rolls manufactured by Messrs. James Bennie & Sons, Glasgow.

There is a fair amount of repairing work at present in the port, and most of the graving docks are occupied.

In the building of ships' boats, there is practically nothing doing, and very few of the operatives are able to obtain even partial employment.

**Engineering.**—The outlook at the Palmer's Hill Engine Works has improved, it being understood that very powerful engines for two foreign ordered boats, are to be built there. This, of course, is not the only work to be dealt with, and in addition to repair contracts, there is a good deal doing in connection with the supply of Dickinson's patent crank shaft to steamers coming into North-Eastern and other ports. There is also an improved state of business at Messrs. Duxford's Works, and in relation to the future of some other local establishments a more hopeful feeling prevails.

The equipment of the Wear Commissioners' No. 1 Graving Dock with new pumping plant by Messrs. Tangye, of Birmingham, is now completed, and the machinery has been tested with results entirely satisfactory to all parties, the dock having been emptied in less than  $1\frac{1}{2}$  hours, at a cost (for gas supply), of 6s. 9d. The installation consists of two 40 H.P. Tangye's gas engines, each connected direct to a 21 in. centrifugal pump; one 8 H.P. gas engine, working in conjunction with the larger engines, an 8 in. centrifugal leakage pump, and a friction clutch air exhausting pump for charging the two main pumps with water at start. The two larger engines have beds cast with large flanged facings, so as to admit of the centrifugal pumps being bolted to them, thus preventing the possibility of the engines and pumps getting out of line with each other. The pumps are capable of discharging 5,200 tons of water per hour, and of emptying the dock in less than two hours at the highest spring tides. When the pumps are at full work, the gas engines will each indicate over 120 H.P. To ensure certainty of starting without the intervention of hand-labour, the engines are fitted with Tangye's latest pressure starter (Pinkney's patent). The 8 H.P. engine has a small pump attached to its bed, which can be instantaneously thrown into or out of action at the will of the attendant. It is employed to pump a charge of gas and air into a mild steel receiver, to a moderate pressure. This receiver is connected to the 40 H.P. engine by means of piping and starting valves, so arranged that the pressure in the receiver shall start the engines before the charge is ignited, thus securing the attainment of rapid motion immediately. This system is so effective, that engines have been started with  $\frac{1}{2}$  load on. The engines are, of course, always ready for being put in work within a very few minutes, and a great saving of time is in this way effected. Float gear has been provided for altering the speed of the main engines to suit the height of water in the dock. The speed of the 8 H.P. engines can be increased or reduced at pleasure, so as to meet requirements in the matter of pumping out leakage. Messrs. Tangyes, Limited, whose works are at Birmingham, with depots at all the principal centres, including Newcastle-on-Tyne, have applied their large gas engines extensively and for a variety of purposes, with unqualified success. Their steam-driven centrifugal pumping engines are also well known throughout the North-Eastern district for dock purposes; the largest examples being—One pair each of 36 in. pumps at the Wallsend Slipway and Engineering Co.'s dock; the Tyne Pontoons Co.'s dock; and the Manchester Ship Canal Pontoons Co.'s dock. There is also a pair of 30 in. pumps at Messrs. J. Readhead & Son's dock, South Shields. These pumps (excepting the pair last referred to) have an approximate delivery capacity of 50,000 gallons per minute.

**The Hartlepool.**—It is understood that some additional orders have been booked by shipbuilders at this centre, and a fairly busy time during the remainder of the year is looked forward to. Business at the Central Marine Engine Works continues fairly active. Since our last report the steamers *Argo* and *Pectan* have been fitted with machinery, and the former vessel had her trial trip on August 20th. The *Argo* is a very handsome and admirably equipped cargo boat, built by Sir W. Gray & Co., for Messrs. Rickinson, Son & Co., of West Hartlepool. The engines are of the well-known Central Marine triple-expansion type, and are capable of developing over 1,200 H.P. The cylinders are 24 in., 38 in., 64 in., by 42 in. stroke, steam being supplied by two extra large steel boilers, working at a pressure of 160 lbs. At the trial the machinery gave complete satisfaction, there being no hitch or trouble of any kind. This is the seventh steamer built by Messrs. Gray & Co. and engined at the Central Works for the same owners, and there is another boat now building for them, to be engined at the Central Works. The s.s. *Pectan* is of large size, and was built by Messrs. Gray & Co. to the order of Messrs. Samuel & Co., of London, for employment in the oil trade. The engines—which, with the boilers, are placed in the

after part of the vessel—are of the triple-expansion type, the cylinders being 27 $\frac{1}{4}$  in., 43 $\frac{1}{4}$  in., 78 in., with 48 in. stroke. Three large boilers, to work at 160 lbs. pressure, are provided for the supply of steam.

**Stockton.**—In connection with shipbuilding a more hopeful feeling prevails here, as well as at other centres, and there are indications of a prospective increase in the amount of work in the yards. Engineering works are moderately well employed, and there appears to be rather more work in progress at the rolling mills. Some of the boilermaking establishments are actively employed; but bridge building works are slack. At Stockton Forge there is a fair amount of work in hand, but other works of a similar kind are rather slack.

**Middlesbro'.**—The prospect, so far as shipbuilding work is concerned at this centre, is fairly encouraging, the state of affairs at Messrs. Raylton Dixon & Co.'s yard being particularly satisfactory. In the iron and steel works, orders are more plentiful than they were a few weeks ago, and the prices of product are decidedly firmer. The engineering works of Messrs. Westgarth & English are kept going steadily, but most other engineering establishments are short of orders.

**Consett.**—Business at the Consett Iron and Steel Works is most satisfactory, considering the generally dull state of trade, and for a concern of such vast extent, and such varied productive capacity, it is little short of marvellous that such a condition of uniform briskness should be maintained.

## THE MERSEY.

(From our own Correspondent.)

**G**ENERALLY the position as regards all branches of the marine engineering industry on the Liverpool side of the Mersey continues about as unsatisfactory as it could well be. The only work of any moment which the principal marine firms have been securing for some time past has been confined almost entirely to refitting steamships with new boilers, and even this branch of work is slackening off; whilst so far as new engines for steamers, or any work of this description is concerned, it would seem to have departed from Liverpool almost entirely, nothing of any weight whatever having been placed with Liverpool engineers for a very long time past. With regard to shipbuilding, except occasional very small vessels or barges, it is quite a dead letter, and the yards which, until within a couple of years back, turned out some of the largest iron sailing vessels afloat, are now practically altogether dependent upon repair work to keep them going, and this necessarily only in a very occasional and unsatisfactory manner. On the Birkenhead side, however, the position is quite different; during the last few months there has been a steady improvement in the weight of new work coming forward, and there is now more activity than has been the case for some time past. Messrs. Laird Bros. are tolerably full of work, amongst which they have in progress several torpedo catchers, both for home and foreign Governments, and other important new work on the point of settlement. Reports, which, however, are rather premature, have appeared to the effect that they have received a contract to build the new fleet of twin-screw steamers with which the City of Dublin Steam Packet Co. will conduct the improved mail service between Holyhead and Kingston; further more definite particulars with regard to this important contract I hope to give in next issue.

In the general engineering trades there is a continued steadily-increasing activity, and establishments in most branches are getting fairly well supplied with work. Boiler-makers are in a decidedly improved position as compared with two or three months back; machine tool makers have been receiving a fair weight of new orders recently, and stationary engine builders are all well engaged.

The returns issued by the engineering trades union societies indicate a steady improvement in trade, but there has been no decrease in the unemployed list, this being due to several disputes that have been going on, the chief being that in the shipbuilding trade of North Lancashire with regard to boiler-makers doing the work of fitters, and it is expected that the settlement of the last-named dispute, which has just been effected, will afford some relief as regards the number of out-of-



work members on the books of the societies. The Amalgamated Society of Engineers has still about six per cent. of its total membership on out-of-work support; but in this immediate district, where establishments have been securing more work than for some time past, the number of out-of-work members has dropped to five per cent. of the local membership, which is less than the general average for the whole society, a state of things that has not occurred for a considerable time past. The Steam Engine Makers' Society reports about three per cent. of its total membership on donation benefit, which is about the same as it was last month. The reports from the various districts as to the state of trade are to the effect that it is gradually getting better, more work being secured in most branches. Machinists, machine tool makers and stationary engine builders are all fairly engaged; locomotive builders report brighter prospects, and in marine centres the outlook is more satisfactory.

Messrs. A. C. Wells & Co., Manchester and London, have just completed an improved pattern of their already well-known patent plumbers' furnace, which has met with a large demand from the trade. The new pattern, which is practically a modification and enlargement of the small furnace constructed for plumbers' use, has been specially designed for shipbuilding requirements, and can be used either as a heating furnace for iron bars, or other parts of machinery, or when not required for this special work can be readily adapted for use as a small portable Wells light. This furnace, of which we hope to give a more detailed description with illustrations in our next issue, is a very handy appliance and is self-contained, so that it can be readily carried about from one point to another.

The half-yearly report of the Manchester Ship Canal shows substantial progress so far as increase of traffic is concerned, but the financial position remains anything but satisfactory. To enable the company to meet the fixed charges out of revenue, the Manchester Corporation have had to forego, for the present, half the interest on their advances to the company, that is, in place of receiving £112,500, the amount of interest falling due on the 1st July last, they have agreed to take £56,250, and the Corporation will themselves have to provide the difference for the interest due on debentures. The traffic returns, from purely commercial sources, show an increase of 55 per cent. upon the previous corresponding half-year. On the tonnage there was an increase last month of more than 14,000 tons over the biggest previous month, May, when the sea-going traffic was 91,886, against 106,000 tons last month. A slight retrogression took place in June from the previous record month of 8,400 tons, but taking June and July together the gross tonnage is 194,400 or 97,200 per month, as compared with an average for the first six months of the year, of 80,000. The receipts per ton for the seven months' sea-going traffic in 1895, are as follows:—January, 77,138 tons, at 2s. 1d. per ton; February, 67,780 tons, 2s. 1½d. per ton; March, 76,828 tons, 2s. 2½d. per ton; April, 78,802 tons, 2s. 5d. per ton; May, 91,886 tons, 2s. 3½d. per ton; June, 88,423 tons, 2s. 5d. per ton; July, 105,994 tons, 2s. 1½d. per ton. These figures show a slight falling off in receipts per ton, but this is a feature common to all ports, and depends upon the various classes of traffic using the Canal month by month. The traffic for the past six months reached 480,784 tons, and the average receipts 2s. 3½d. per ton. If the tonnage for July can be maintained during the rest of the year, the gross tonnage would reach close on 1,250,000 tons, no insignificant achievement for the second year of working. The Canal has already secured a firm and permanent footing as regards several important trades, and the Chairman informed the half-yearly meeting that of green fruit they had 20,000 tons this year, as compared with 9,600 in the corresponding half of 1894, and of paper-making material they carried 28,800 tons against only 2,800 in the corresponding half-year; timber was also a trade that was assuming very large proportions, but the season had only just commenced; while pig-iron, which was a trade that they previously utterly failed to get, owing to the former prohibitory rates of freights demanded by shipowners, now stood at 13,200 tons for the latter portion of the half-year, as against only 500 tons in the corresponding half-year, and since June, pig-iron had been coming in in very large quantities. The export of machinery was a trade that was growing, especially with Bombay, because the owners of the steamers were assisting the company to get the traffic. He was very glad to be able to tell them that the directors had persuaded the four great

Indian railway companies, whose lines served Bombay, to insert Manchester as one of the ports in their contract. Another encouraging feature was that the Clan Line had promised Messrs. Johnson, Dodds & Co. to run a line of steamers every six weeks from Calcutta, calling at Madras and Colombo, the firm undertaking to give them a certain quantity of tea to carry.

In the iron trade, a strong tone has been maintained all through the month, both as regards raw and manufactured material. A considerable weight of business has been put through, and prices have shown a steady hardening tendency, with the result that for pig-iron they are now 1s. to 1s. 6d. higher than last month, with makers very firm at the advanced rates. Local makers of pig-iron are not securing any large weight of orders, but they hold to their full quotations, which are about 1s. above those given last month, No. 3 foundry being now quoted 44s. 6d. less 2½ delivered Manchester. In district brands, makers, who are indifferent about booking further orders, have also advanced their quotations 1s. per ton, Lincolnshire being now quoted 39s. 6d. for forge, and 41s. for foundry, with Derbyshire foundry 44s. 6d. to 45s. net cash delivered Manchester. In outside brands a considerable weight of business has been put through, and there has been a hardening tendency in prices, which have during the month been steadily moving upwards, good foundry Middlesbrough now being quoted at 45s. 10d. net cash delivered Manchester, although ordinary G.M.B.'s could in some instances be bought 6d. less; Scotch iron is now firm at about 47s. for Eglinton, 47s. 6d. for Glengarnock, and 50s. for Gartsherrie delivered Lancashire ports, and 2s. to 2s. 6d. more for delivery, Dock Quays, Manchester.

In the manufactured iron trade makers are all better off for work, and quoting higher prices. For bars, Lancashire makers are now quoting £5 5s. and North Staffordshire bars now average from £5 6s. to £5 7s. 6d., delivered Manchester district. Sheets have also hardened in price, £7 5s. to £7 7s. 6d. now being quoted, and the Hoop Makers' Association have advanced their list rates 5s. per ton, random now averaging £6, and special cut lengths £6 5s., delivered Manchester district, and 2s. 6d. less for shipment; this advance, however, has been forced upon makers by the upward movement in raw material, and it is not due to any special activity in trade.

In the steel trade no material change is noticeable, except a stronger tone in prices for some descriptions. Hematites are now quoted 53s. 6d. to 54s. 6d., less 2½ for good foundry qualities; steel billets average about £4 to £4 5s. net cash; steel machine bars about £6 to £6 2s. 6d., with boiler plates now quoted £6 5s. delivered Manchester district.

In the metal market there has been a moderate business stirring, and with the upward move in raw material list rates for manufactured goods have been advanced ½d. per lb., delivered Manchester district, these being now as under:—Solid drawn brass boiler tubes, 6½d.; brass surface condenser tubes, 7½d.; copper tubes, 7½d.; brazed copper gas and steam tube, 7½d.; brazed brass gas tube, 7d.; brass machine tube, 6½d.; brass wire, 5½d.; copper wire, 6½d.; rolled brass, 5½d.; sheet brass, 6½d.; and yellow metal condenser plates, 5½d. per lb.

The timber trade has been rather more active, but prices show no advance. Imports have been moderate and deliveries fair, but stocks are ample,—in some cases too heavy. In East India teak, both logs and planks have been imported in excess of the demand, and recent sales are at lower rates; stocks are excessive. Of greenheart there have been no arrivals, and with a good consumption stocks are lighter. Prices, however, are unchanged.

In the coal trade a depressed tone prevails with business very small in weight, and pits only working about half-time. House coals remain in the slowest possible request, but colliery owners hold on to list rates in anticipation of an increased demand for winter requirements coming forward in a few weeks, and best Wigan Arley still average 10s. to 10s. 6d.; seconds Arley and Pemberton 4 ft., 8s. to 8s. 6d.; and common house coal, 7s. to 7s. 6d. per ton at the pit mouth. The usual holiday stoppages in the manufacturing districts have necessarily interfered with the demand for the lower qualities of round coal, which remain a drug upon the market, with low prices taken to effect sales, although 6s. to 6s. 6d. are still the list quotations for steam and forge coals at the pit mouth. Engine fuel moves off fairly well, owing to the limited output, but supplies are readily obtained out of stock slack held at some of the collieries, and p

not more than maintained at 3s. to 3s. 6d. for common, and 4s. 6d. to 5s. for better qualities at the pit mouth.

For shipment only a slow business is reported with prices extremely low, steam coal ranging from 7s. 8d. and 7s. 6d. to 7s. 9d. and 8s., according to quality, delivered at the Garston Docks or the High Level, Liverpool.

## BELFAST TRADE NOTES.

(From our own Correspondent.)

THERE is no material change to report in the shipbuilding and engineering trades here since last month, work proceeds briskly, and the outlook for some time to come is of the brightest description. The launches since last Notes amounted to three, viz., the *Armenian* and *American*, both from the yard of Messrs. Harland & Wolff, and the *Pakling*, from the yard of Messrs. Workman, Clark & Co.

The *Armenian*, which has been built to the order of Messrs. F. Leyland & Co., Liverpool, and is the same as the *Victorian*, whose launch was reported last month, and is of 8,730 tons gross, and 512 ft. in length.

The *American*, also for Messrs. Leyland, is of the same tonnage as the *Victorian* and *Armenian*. Messrs. Harland & Wolff have another of the same size in their yard for Messrs. Leyland, to be named the *Historian*, which completes Messrs. Leyland's order.

The aggregate tonnage of the four vessels is 34,920 tons, and they all class as the second largest cargo steamers in the world; they have been built to conduct the cargo and cattle service of the Leyland Line between Boston, New York, and Liverpool, the present steamers, mostly the productions of the Queen's Island, being unable to cope with the fast increasing trade of this prosperous line.

The White Star liner *Doric* arrived here on Friday, 26th July, to be treated in the same manner as the same company's *Ionic*, *Coptic*, and *Germanic*, which have proved such a success after being re-engined by their famous builders.

The *Doric* is one of the White Star liners under charter to the Shaw, Savill & Albion Co., and with the *Gothic* and *Ionic*, conducts the service from London to New Zealand. Her old engines have been taken out and she is now in dry dock, and will be hurried on as fast as possible.

The Union Co.'s Royal Mail twin-screw steamer *Norman* arrived here on Thursday, August 22nd, for repairs at the hands of her builders, Messrs. Harland & Wolff. It will be remembered that on her last outward voyage, after having delivered the mails at Capetown, the *Norman* continued her voyage round to the eastward, and whilst there she struck on a rock which does not appear in the chart. The damage sustained was not of a serious character, and the vessel was enabled to complete her voyage. On returning to Capetown the *Norman* was placed in dry dock, and temporary repairs were executed. The examination showed that some of the propeller blades had been bent and that a few of the plates on her bottom had received slight injuries. The *Norman* was brought back to England in the usual course of sailing, and sent round from Southampton in order that the necessary repairs could be executed by her builders. She will not be placed in dry dock for a few days, as the only available docks are now fully occupied. After the *Oroya* comes out of the Alexandra dock, where she has been undergoing repairs, as previously stated, having been ashore at Naples, the *Norman* will go in, and the repairs executed with all despatch, as she is advertised to sail from Southampton on Saturday, the 9th of November.

It is expected that the *Oroya* will come out of dock this week, and will shortly afterwards proceed to London to take up her usual sailings to Australian ports.

To say that Messrs. Harland & Wolff are busy at present would be using a mild phrase; in fact, it is doubtful if any other firm in the world have so much tonnage at their berths; when we come to add up we find that the gross tonnage of the new boats and those under repairs amounts to no less than 46,890 tons. This will give a fair idea of the amount of work on hand.

The White Star cargo steamer *Georgic* had her trial trip during the month and attained a speed of 13 knots light. It is expected that she will steam about 12 knots loaded at sea, enabling her to make the voyage between Liverpool and New York in about nine days. When going down the lough the big ship stranded

outside the twin islands, owing to her draught, which was 18 ft. light, but she came off all right at next tide. After the trial she proceeded to Liverpool, where she was docked and found to have sustained no damage. She loaded and sailed for New York on her maiden voyage on the 16th ult. Her performances will be watched with interest, as she certainly is the largest thing of the kind attempted since the *Great Eastern* ceased to exist.

The s.s. *Pakling*, launched by Messrs. Workman, Clark & Co. on July 24th, is a screw steamer of 4,600 tons gross, and has been built to the order of the China Mutual Steam Navigation Co. The *Pakling* is the third steamer built by Messrs. Workman, Clark & Co. for the China Co., the other two boats, the *Oopack* and *Chingwo*, having given every satisfaction. They have at present two others of similar tonnage to the *Pakling* on hand for the same owners, one of which will be launched shortly.

The s.s. *Ardandearc*, built by Messrs. Workman, Clark & Co. to the order of Clarke & Service, of Glasgow, had her trial trip on the 25th of July, and attained a speed of twelve knots per hour. Everything worked well to the satisfaction of the owners and their engineers.

Messrs. Workman, Clark & Co. lately were commissioned by Messrs. George Smith & Co., Glasgow, owners of the well-known "City" Line of steamers, to build for them a large passenger steamer of large power and high speed. She will be the largest vessel of the kind that Messrs. Workman, Clark & Co. have ever built.

## NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

Barrow.—The shipbuilding and marine engineering trades at Barrow are not in a much better position as regards orders than they were a month ago. It is true they have booked a second Clan liner for Messrs. Cayzer, Irvine & Co. of 4,000 tons. Last month they secured the order for the *Clan Mensies*, a duplicate of the s.s. *Clan Ross*, built in the same yard last year, and now they have been entrusted with the order to build another duplicate steamer, the *Clan Lindsay*. These steamers differ a little from the *Clan Ross* type in details of construction, and are to be fitted with telescopic masts so as to afford means of working the trade on the Manchester Ship Canal. The Clan Line has already established a good trade between Manchester and the Persian Gulf and Indian ports. These Clan liners and the sand pump dredger of the *Branker* type, building for the Mersey Dock and Harbour Board, represent the only commercial shipping now engaging the attention of the N. C. & A. Co. Builders find orders for new tonnage very scarce and even those contracts which are offering are at prices which leave no margin of profit. It is expected both Clan liners will be launched either this year or early next year, and in the meantime efforts will be made to secure new orders. The construction of the new *Branker* has proceeded very satisfactorily, and it has been arranged to launch the vessel early in September. Her engines and pump appliances are all ready for placing in the ship when she is launched, so that an early delivery of this very remarkable vessel, seeing the good work already done by her sister ship, the *Branker*, may be looked for. A good business ought to be done in the building of this class of dredger for all ports where the barriers to their entrance are bars of sand, easily pumped and cleared away, as is the case at Liverpool. The patents embraced in these vessels are held by Mr. Lyster, the engineer to the Mersey Dock and Harbour Board, who has succeeded in creating a dredger that works very satisfactorily in the operations which it has been specially built to undertake, and there cannot be any question that in all cases where dredging can be done by means of pumping, the system adopted in the *Branker* will be copied by harbour authorities in the future. Gradually the work of construction required in the second-class cruisers *Doris* and *Juno* is approaching nearer completion, and it seems likely that one of these cruisers at least will be launched this year. If so there will be plenty of room on the ways for new ships to be put down. There is some talk about orders for the Canadian Pacific Co.'s Atlantic liners, and for the Japanese Government, but the latter, so far as is known, have not approached the Barrow Co., although representatives from the Japanese legation were present at the launch of H.M.S. *Powerful* at Barrow, and were then able to see the class of work which can be done here.

When the launches of the five ships now building at Barrow take place the yard will be bare, but there will be an exceeding amount of briskness on the engineering side of the yard, and in the Devonshire Dock, where all the vessels built at Barrow receive their engines, boilers and general fittings. There will be the *Powerful*, *Junio*, and *Doris*, and possibly the new *Branker*, at one time all being fitted up, and all finding employment for the 100-ton crane. The need of an auxiliary crane is shown. One to lift 100 tons—say a set of sheerlegs—such as those provided at most yards, would be found much handier than the great hydraulic crane now in use, good as that is. The work in connection with the engineering of the *Powerful* has been delayed for more than a month in consequence of a strike of engineers against the Boilermakers and Iron Shipbuilders' Society. Certain work which has been done by the shipbuilders in the Barrow yard is claimed by the engineers, the following being the statement of their claim:—(1) To the fitting and fixing of the sill plates in the casemates, and the cast-steel angle pieces on the same. (2) The hinging, fitting, and fastening of all gun-port doors, whether watertight or not. (3) All gangway and washport doors on Admiralty vessels to be allotted to the engineers. (4) That no caulker be allowed the use of a vice, or to fit metal castings, or finish machine wrought work. (5) That the firm will use their influence in bringing this about with a view of forming a full list which will guide future work.

In these claims, the engineers embrace work which hitherto has not been done by them at Barrow. The question was made the subject of a conference held at Glasgow in the second week of August. The interests of the employers were represented by the Federation of Engineers and Shipbuilders, and Mr. D. Dunlop presided. An equal number of representatives of the engineers and shipbuilders were present. The merits of the case were not gone into, but it was decided that the engineers should re-start work on the 19th of August, pending the decision of another conference of engineers and shipbuilders, held at Barrow on the 27th August, the work in dispute in the meantime to remain in abeyance. Much interest naturally centres in this question, as it affects the shipbuilding and engineering trades of the country generally, and not Barrow in particular. Now that the strike is over, although the difficulty is not settled, a good deal of activity is noticeable in the engineering shops. The engines of H.M.S. *Powerful* are in a forward state, and will soon be ready to drop into the hold. The work of constructing the Belleville boilers, which was also the subject of a conference between these two trades, has now been entrusted with the boilermakers, and they are proceeding very well with the work. Night and day shifts are worked in the engineering department, and the boilermakers are also very busy.

The Naval Construction and Armaments Co. has not been able to declare a dividend for the last half year. An interim dividend of 1½ per cent. was declared in January, but since then, owing to unavoidable delays in the completion of work, and the fact that some of the orders have been taken at cost price, and establishment charges, no available balance is left for the shareholders to divide. In fact, some of the work done, represents a loss. Better results are expected next year, although many of the orders in hand will not by the time have been delivered.

Some interest attaches to the annual visit of Lloyd's Committee to Barrow this year, on the 17th of August, because Mr. B. Martell, chief surveyor, took advantage of the occasion to point out the well-known fact that yards which usually turn out the best class of work, and have specially skilled men to do this work, stand a very poor chance in competition with other firms for any second-class type of ships in the market, because men in second-class yards are expected to get through more work at a less cost. A quotation from Mr. Martell's speech on this subject is worth giving. He said:—"Lloyd's Committee had all witnessed the enormous growth and development of the Naval Construction and Armament Co. from its first initiation. It began well, as the first ships the company built were of a splendid character—ships which when they were first introduced here brought into this town of Barrow a high description of work, which had never been deviated from, and a class of workmen who were capable of doing work of as superior quality and of as great an excellence as could be required. They had an instance of this in the vessel they had gone through that morning, although it was only a dredger. Dredgers were not regarded in the highest sense as specimens of naval architecture,

but as the chairman (Mr. Tindall) said to him, in looking over, as he always does, the various ships being constructed in all the yards they visited, and in inspecting the workmanship, 'this work is of a very excellent character, and I may say, as far as quality of workmanship is concerned, it is as good as that required by a first-class Atlantic liner.' No work could be better. In a yard like this they undertook to do work of the very best description, and as a consequence had to draw men to their yard who were specially trained for the work, and capable of doing it. It made it very difficult for men employed in this class of work to do anything else, and it made it very difficult for a company like this to compete with other firms which did not do the same description of work, because the men who did inferior work did not do it in the same way, and could consequently get through a greater amount of work than could be accomplished in a yard like that at Barrow. At the same time this work was not of the same uniformity of quality, because where they had, as in the case at Barrow, specially trained men for good work, they could not deviate from it, but kept up to the same uniformity of excellence whether they were engaged in the building of a dredger or a first-class liner. He was very glad to come again into the Barrow yard, and see such workmanship, and it was very gratifying to look over ships in various stages of construction, and to see there was no desire or intention to perform anything but the best description of work. They could only thank them as a committee for the cordiality of their reception, and for the kindness and courtesy which had been shown to them in this yard. He hoped that the work they did would be successful, not only to the owners for which the company built, but for the company itself. It deserved to be so, because the work was of excellent quality, and won the appreciation of Lloyd's Registry and committee. He was very sorry Mr. Adamson was not present, because he had a very high regard for him. He had gone through all the grades of a naval architect, and had excelled in them all. The magnificent ship *Powerful*, which they had seen that day, and whose launch a week or two ago was a success of so exceptional a character, was a great credit to Mr. Adamson, and he felt sure it must have highly pleased the directors of this company. It was most particularly gratifying to him on the day of the launch to see everything pass off in the successful manner it did. Fortunately they had over the engineering department of this yard Mr. Blechynden, who had a very high engineering reputation. They had not that day, as on the last occasion, the opportunity of witnessing the testing of one of the tubular boilers of Mr. Blechynden's design. That gentleman's capabilities were well known and recognised throughout the country, and they had seen for themselves that day not only in the engineering works, but in the shipbuilding yard, work of the very highest quality, in the accomplishment of which the highest intelligence was required, and the results achieved must afford the greatest satisfaction to all those who were in any way interested."

**Shipbuilding Material.**—There is a fair but not brisk demand for various descriptions of shipbuilding material, but even local orders have had to go past local makers, because of the refusal of the men employed by the Barrow Steel Co. to work on the terms of the award of Mr. Jeremiah Head in reference to a reduction of wages averaging about ten per cent. all round. As a consequence, the steel works at Barrow have been closed for an indefinite period, and will certainly not be reopened until arrangements are made with the men, or until there is a greater margin of profit than is now available on the basis of existing prices.

**The Hematite Trade.**—Various erratic movements have been noticeable in the hematite pig-iron trade during the month, but speculative influences may be looked upon as the cause of this. There is a good demand at the end of August for warrant iron, which merchants and others are stocking at an advance in prices of about 1s. to 2s. per ton, warrants being quoted at 46s. 9d. net cash, sellers and makers asking 47s. There is also a rather better consumptive demand; but generally speaking the indications of the market are not healthful, nor are the prospects for the winter months hopeful.

**Rigby's Tannate of Soda.**—We understand that Messrs. Ralph Rigby & Co., of Walsall, have just completed, through their Liverpool agents, a contract for the supply for twelve months of their tannate of soda to three of the largest steamship companies in that port.

## LAUNCHES AND TRIAL TRIPS.

## LAUNCHES.—ENGLISH.

**Channel Queen.**—On July 13th Messrs. Craggs launched at Middlesbrough a steel twin-screw passenger and cargo steamer of the following dimensions:—185 ft. long, 24 ft. broad, by 10 ft. 6 in. depth moulded. She will be fitted with engines by Messrs. Westgarth, English & Co., of Middlesbrough, having cylinders 18 in., 20 in., and 32 in., by 20 in. stroke. The vessel has been built for the Plymouth, Channel Islands and Brittany Steamship Co., Limited, of Guernsey, for their passenger and cargo trade between Plymouth, Channel Islands and St. Brieuc. She was christened the *Channel Queen*.

**Bedouin.**—On July 20th a steel schooner-rigged steamer of about 3,537 tons named the *Bedouin*, was launched at Newcastle, owned by the Bedouin Steam Navigation Co., of Liverpool.

**Le Cog.**—On July 20th a steel steamer, of about 3,920 gross tonnage, built at Newcastle by Sir W. G. Armstrong, Mitchell & Co., Limited, was launched at Newcastle (port of registry).

**Olaf Kyrr.**—On July 23rd there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, West Docks, South Shields, a new steel screw steamer. The vessel is of the partial awning-deck type, with poop and raised quarter-deck aft, and is of the following dimensions, viz.:—Length, 321 ft.; breadth, 41½ ft.; depth, moulded, 24 ft. 4½ in. She is fitted with all the latest improvements for the general cargo trades, and takes the highest class at Lloyd's and at the Norwegian Veritas. Her deadweight capacity is 4,850 tons. The engines, also built by Messrs. John Readhead & Sons, are on the triple-expansion principle, and have cylinders of 24 in., 40 in., and 64 in. diameter by 42-in. stroke, steam being supplied by two large steel boilers working at a pressure of 160 lbs. The steamer, which has been built to the order of Messrs. Bergh & Helland, of Bergen, was named as she left the ways the *Olaf Kyrr*, the christening ceremony being performed by Mrs. Falsen, wife of Captain Falsen. This is the third vessel built for the same owners by Messrs. John Readhead & Sons.

**Tyr.**—On July 23rd there was launched by Messrs. Blumer & Co., at Sunderland, the steel screw steamer *Tyr*, which has been built to the order of Mr. Wilhelm Wilhelmsen, of Tonsberg. She is of the following dimensions:—Length, 285 ft.; breadth, 40 ft.; depth, moulded, 20 ft.

**Eddie.**—On July 23rd Messrs. Turnbull launched at Whitby a new screw steamer, the particulars of which are as follows:—Length between perpendiculars, 880 ft.; breadth, extreme, 43 ft.; depth to cellular floor, 21 ft. 6½ in.; depth, moulded, 24 ft. She is built under the three-deck rule (with one deck laid), and her estimated deadweight carrying capacity is 8,950 tons. She is classed 100 A1 at Lloyd's, and will be fitted with triple-expansion engines by Messrs. Blair & Co., Stockton. The new vessel was christened *Eddie*.

**St. Adrian.**—On July 24th the first steam fishing liner built for the St. Adrian Steam Fishing Co., Limited, was launched from Mr. Fulton's yard at Pittenweem, the vessel being named the *St. Adrian*. Her dimensions are:—95 ft. in length, over all; keel, 86 ft.; beam, 19 ft.; and water draught, 9 ft.

**Willy Rickmers.**—On July 24th a four-masted steel barque, of about 2,095 tons gross, named the *Willy Rickmers*, was launched at Maryport; owned by the Rickmers Reismuhlen Rhederei and Schiffsbau Actien Gesellschaft of Bremerhaven.

**Argonaut.**—On July 27th an iron steam ketch, of about 149 tons, named the *Argonaut*, was launched at Hull, owned by Messrs. C. Hillyer & Co., Limited, of Hull.

**Westmeath.**—On Saturday morning, July 27th, an event of considerable importance in the annals of the shipping world took place at the establishment of Messrs. C. S. Swan & Hunter, the well-known shipbuilders at Wallsend-on-Tyne, this event being the launching of the largest cargo steamer yet built in England or Scotland. This steamer has been built to the order of R. M. Hudson, Esq., of Sunderland, who is the oldest and one of the most respected shipowners in the North of England, or indeed in the United Kingdom. The s.s. *Westmeath*, which was launched on Saturday, is entitled to the distinction of being considered the largest carrier which has yet been launched, with the exception of the s.s. *Georgic*, now being completed in Belfast by Messrs. Harland & Wolff. The dimen-

sions of the new steamer, the s.s. *Westmeath*, are 465 ft. over all, by 66 ft. beam by 34 ft. 6 in. depth, moulded, with very long deck erections, the bridge being 250 ft. long. She is built to the spar deck rule and to the highest class under special survey in Lloyd's Register (of which Committee Mr. R. M. Hudson has long been a member), and will be fitted out in the most complete manner possible, with every facility which can be devised for rapidly handling the large cargoes which she is intended to carry, and for this purpose she will be supplied with nine of the most powerful steam winches by Messrs. Welford Bros., of Sunderland, in addition to which there will be fitted at quarter breadth at the different hatchways large derrick posts with an ample outfit of derricks and gear, so that cargo can be discharged from both sides of the vessel at once, or may be taken in at one side while discharging at the other. For steaming in ballast trim the steamer has been built with a cellular double bottom throughout, which will contain an unusual weight of water ballast, in addition to which deep tanks are fitted up aft for the same purpose and for the purpose of properly immersing the propeller. The s.s. *Westmeath* is not intended to carry passengers, but the comfort of the captain, officers, engineers and crew has been very carefully considered, and the quarters are of an exceedingly comfortable and substantial description, the captain, officers and engineers being berthed in steel deck houses on the top of the long bridge house clear of all cargo spaces. It is expected that the cargo to be carried by the s.s. *Westmeath* will be not less than 10,250 tons deadweight; or 14,500 tons of measurement cargo, in addition to a very large bunker capacity. The machinery has been built, and will be shipped immediately by Messrs. The Wallsend Slipway and Engineering Co., Limited. The engines are of the triple-expansion description, with cylinders 28 in., 46 in. and 75 in. respectively by 54 in. stroke; and steam will be supplied at 180 lbs. working pressure by three large boilers, 14 ft. 3 in. diameter by 11 ft. 9 in. long, fitted with Howden's system of forced draught, Selve tubes and Purvis's patent ribbed furnaces. The propeller blades will be made of manganese bronze, manufactured by Messrs. Henry Watson & Sons, of Walker Gate. During the construction the s.s. *Westmeath* has been superintended and the details arranged by Captain Johnson, whilst the machinery department has been supervised by Mr. T. Graham, on behalf of the owners.

**Rosario.**—On Thursday, August 1st, Messrs. Craig, Taylor & Co. launched from their Thornaby Shipbuilding Yard a small vessel named the *Rosario*, for the Spanish coasting trade.

**Thistle.**—On Friday, August 2nd, there was launched from the shipbuilding yard of Messrs. Cox & Co., Falmouth, a very handsomely modelled tug of the most modern type, of the following dimensions:—Length, 100 ft.; breadth, 18 ft.; depth, 10 ft. 4 in. The vessel was named the *Thistle*, and is owned by Messrs. D. B. McCallum & Son, engineers, Cardiff, who have made arrangements to tow the vessel to Cardiff. Upon her arrival there they will instantly proceed to place very powerful compound surface-condensing engines of their own construction into her. She will be fitted with a bronze propeller of first-class design, Clarke Chapman's steam and hand windlass, Chadburn's telegraph, and a powerful hand-steering gear. The steering bridge will be raised on high stanchions the fore side of the funnel. Ample accommodation for the crew will be provided forward, and the master and officers will be berthed aft. The tug when complete will be a very valuable addition to Cardiff, and Messrs. McCallum & Son are to be congratulated upon being the possessors of so fine a tug.

**Yasco.**—On Tuesday, August 6th, Messrs. Furness, Withy & Co., Limited, launched from their shipbuilding works at Hartlepool a steel screw steamer, built to the order of Messrs. T. Wilson, Sons & Co., Limited, Hull. The vessel is a substantial type of a modern cargo boat, measuring well on to 300 ft. in length, and is built throughout of Siemens-Martin steel, and rivetted with steel rivets. A former ship built by this firm for the same owners to the British Corporation rules gave such general satisfaction that this vessel has been built to the same classification, and it is anticipated that still better results will be attained. These rules embody many important features in connection with the distribution of strength in the construction of the ship. Every care has been taken in the design to build the vessel as strong as possible for the heavy deadweight trade. The hull is built on the web frame system, with cellular double bottom all fore and aft, and subdivided at intervals; the after peak being also available as a tank. The greater portion of the shell plating is in 24 ft. lengths, and in

way of the engine-room there are several plates 82 ft. long, thus doing away with a large number of butts or breaking points, and is efficiently backed up by strong sectional framing to the top of the vessel. The bottom plating is thicker in way of the ballast tanks to allow for the vessel lying aground whilst loading. The main deck, tank top, floor plates, etc., are also of extra thickness, and the hatchways are of extra size to take in the bulkiest cargo. Large winches to hatches, patent steam steering gear amidships, with hand gear aft, steam windlass, large donkey boiler, and patent stockless anchors are fitted. The vessel will be rigged as a pole-masted schooner, and to make her available for bridge and canal work the topmasts are telescopic. The engines and boilers have been constructed by Messrs. T. Richardson & Sons, Limited, Hartlepool, and are of massive design, with every provision for economical working. The ship and engines have been constructed under the supervision of Mr. Wilkins and Mr. Spear, Messrs. Wilson's surveyors. On leaving the ways the vessel was gracefully christened *Vasco* by Miss Emily Vick.

**Urd.**—On August 6th Messrs. Ropner & Son, Stockton-on-Tees, launched the steel screw steamer *Urd*, her dimensions being:—Length, 323 ft.; breadth, extreme, 41 ft. 6 in.; depth, 24 ft. She has been built to the order of a Norwegian firm, Messrs. Ropner & Son having built several other steamers for the same owner, and is built on the part awning-decked type, having a poop and raised quarter-deck. The vessel has a double bottom on the cellular principle for water ballast, and has been designed to carry a deadweight cargo of 4,700 tons on Lloyd's summer freeboard. Triple-expansion engines will be supplied by Messrs. Blair & Co. The christening ceremony was performed by Miss Eliza Ropner, of Preston Hall.

**Goldenfels.**—On Wednesday, August 7th, Messrs. Wigham Richardson & Co., Newcastle-on-Tyne, launched a steel screw steamer built to the order of the Deutsche Dampfschiffahrts Gesellschaft Hansa of Bremen. The steamer is 340 ft. in length by 44 ft. beam, and will be fitted with engines and boilers constructed by Messrs. Wigham Richardson & Co., the former being of the self-balanced quadruple-expansion type—Schlick & Tweedy's patent—working at 215 lbs. pressure. The owners were represented at the launch by Mr. D. Wulff, the superintendent engineer of the company, under whose guidance the steamer was constructed. As the vessel left the ways she was named the *Goldenfels*, the ceremony being performed by Miss Tweedy, of Newcastle-on-Tyne.

**Newfoundland.**—On Thursday morning, August 8th, the *Newfoundland*, a steam fletcher, which has been built by Messrs. Cochrane & Cooper to the order of the Hull Steam Fishing and Ice Co., generally known as the Red Cross Co., was launched at the Grovehill Shipyard in the presence of a numerous concourse of spectators. The launch was accomplished in a singularly dextrous and facile manner, the vessel on being released from her supports gliding gently into the river with very little displacement of water. The ceremony of christening was very ably performed by Miss Hobbs, daughter of Mr. Hobbs, one of the directors of the Red Cross Co., who was accompanied by Mrs. Cochrane, sen., Mr. Hobbs, Mr. Cooper, and Mr. A. Cochrane, jun. The *Newfoundland* is the one hundred and thirty-fourth vessel built by Messrs. Cochrane & Cooper, and she is the fifth fletcher built for the Red Cross Co., other three being in the course of construction. She is fitted with the new Otter trawling apparatus and will be supplied with engines of 88 H.P. by Messrs. Ames & Smith, of Hull. Her dimensions are:—98 ft. by 20 ft. 6 in. by 11 ft.

**Opossum.**—On August 9th H.M. ship *Opossum* was successfully launched from the Hebburn Shipbuilding Yard of Messrs. R. & W. Hawthorn, Leslie & Co., Limited. The vessel is the second of three being constructed by this firm, and is of the latest type of torpedo boat destroyers. Her length is 200 ft.; breadth, 19 ft.; and depth, 12 ft. 6 in.; displacement, 260 tons. The armament of the *Opossum* will consist of one 12-pounder, five 6-pounder quick-firing guns, and two torpedo deck tubes. The main propelling machinery consists of two sets of vertical triple-expansion engines of specially light design. In the construction of these, steel and the strongest bronzes have been used with a view of combining lightness with strength. The engines at full power will develop about 4,000 I.H.P. when running at about 360 revolutions per minute. Steam will be supplied by eight water-tube boilers, working at 200 lbs. per square inch, and arranged in two separate compartments.

**Manoel Victorino.**—On Monday afternoon, August 19th, Messrs. Craig, Taylor & Co., launched from their Thornaby Shipbuilding Yard a very smart passenger steamer for the Brazilian trade. The dimensions are as follows:—140 ft. by 24 ft. by 9 ft. 5 in. depth, moulded. She has a fine promenade deck all fore and aft, fitted with deck seats, awnings, etc.; large saloon forward for first-class passengers, and accommodation for second-class passengers aft. She is also adapted for carrying cargo in addition to passengers, and she is fitted with two winches, steering gear and windlass, to suit her for her intended trade. Her engines, which will give her a high rate of speed, are being fitted by Messrs. Westgarth, English & Co. The vessel and engines have been built under the superintendence of Mr. John Donald, of Bahia, the engineer for the company for whom the vessel has been built. As she left the ways she was gracefully christened *Manoel Victorino* by Miss Roy Craig, daughter of one of the builders.

**Steel Screw Steamer.**—On Monday afternoon, August 19th, Messrs. Richardson, Duck & Co. launched from their yard a steel screw steamer of the following dimensions:—Length, over all, 325 ft. 6 in.; beam, extreme, 43 ft.; depth, moulded, 23 ft. 8½ in.; gross tonnage, 2,570 tons. This vessel is of the single deck type, and has a break poop, with accommodation for captain, saloon, etc. Bridge over engines and boilers, with engineers' and officers' quarters in after end; and a topgallant forecabin, in which the crew will be berthed. A cellular double bottom for water ballast is fitted throughout, also extra large aft peak tank, and equipment includes four steam winches, large horizontal donkey boiler, steam windlass, stockless anchors, steam steering gear, and all appliances for facilitating loading and discharging. The engines, which will be supplied by Messrs. Blair & Co., Limited, have cylinders 22½ in., 37 in., and 61 in. by 42 in. stroke, steam being supplied by two single-ended boilers, having a working pressure of 160 lbs.

**Rose.**—On August 19th there was successfully launched from the shipbuilding yard of Messrs. Wood, Skinner & Co., at Bill Quay-on-Tyne, a very finely modelled iron screw trawler, which has been built to the order of Mr. John Smart, of North Shields. The following are the principal dimensions of the vessel, viz.:—Length, 91 ft.; breadth, moulded, 19 ft.; depth, moulded, 10 ft. The boat is fitted complete with all the latest improvements for vessels of her class, including a powerful steam trawl winch, substantial trawl gear, &c. Accommodation is provided for the crew forward, and for the captain and officers aft. During construction the vessel has been superintended by Mr. George Turnbull, of North Shields, the owners' inspector. After the launch she was towed to Messrs. Hepple & Co.'s Works, at South Shields, where she will be fitted with a set of compound surface-condensing engines, having cylinders 14 in. and 28 in. by 22 in. stroke, with steam supplied from a steel multitubular boiler 9 ft. long by 9 ft. 9 in. diameter, working at 100 lbs. pressure. As the vessel left the launchways she was named the *Rose* by Miss Smart, daughter of the owner.

**Oak Branch.**—On August 19th there was launched by Messrs. Doxford & Sons at Pallion, Sunderland, a turret ship. This was the *Oak Branch*, constructed to the order of the Nautilus Steam Shipping Co., Limited. The vessel is 340 ft. in length, 45½ ft. in breadth, and 26 ft. 9 in. in depth. She has a gross registered tonnage of 3,250, her net tonnage being 2,050. She has been fitted with triple-expansion engines, the dimensions of the cylinders being 26 in., 42 in., and 68 in., with a 42-in. stroke. She will receive the highest class in both British Corporation and Bureau Veritas. Speaking at the launch, Mr. W. T. Doxford, M.P., said that that vessel was the first of the turret type which had been built for Sunderland owners. It had given his firm great pleasure indeed to launch it, for it seemed to mark an epoch in their history. It was said that a prophet had no honour in his own country, and it would seem as if it were often the case, too, with inventors. He believed Mr. Ritson, the manager of the Nautilus Steam Shipping Co., had had a strong inclination to have one of these vessels from the beginning, but probably he had acted wisely in not having one until they had proved themselves successes as cargo-carrying vessels. Now they had had sufficient experience to prove the good qualities of this type of steamer. The *Oak Branch* was the fifteenth vessel of the type that had been launched, and the vessels had gradually increased in capacity until they had the ship launched that day, which was the largest by some 100 tons, and the improvements that had



their own firm and others they could not have had such a steamer to carry so much on so light a draught, and more and more stress was placed on the character of the ship to carry the improvement further. The introduction of joggled plates, too, had proved successful, and that was the fifth steamer so built. He concluded by expressing the pleasure he had felt in the launch of that vessel for a local firm, and trusted that many local owners would follow Mr. Ritson's example.

**St. Tudwal.**—On Monday, August 19th, there was launched from the West Yard of Messrs. C. S. Swan & Hunter, Wallsend, a steel screw steamer of the following dimensions:—Length, 121 ft.; breadth, 20 ft. 6 in.; depth, moulded, 9 ft. 6 in. The vessel, which is built to the order of Messrs. Thos. Lewis & Co., of the City Steam Mills, Bangor, North Wales, and is the second vessel built for this firm, has a raised quarterdeck extending over the engines and boilers, bridge-house containing very superior accommodation, and break fore-castle with ballast tank forward. The main, quarter and fore-castle decks are of iron, bridge deck of wood, and the steamer will be rigged as a fore-and-aft schooner. The vessel has been built under special survey and will be classed 100 A1 at Lloyd's. The engines, which are compound of the latest type, have been built by Messrs. J. P. Rennoldson & Sons, South Shields. Cylinders 14 in. and 25 in. by 20 in. stroke; boiler, 100 lbs. working pressure. On leaving the ways the vessel was named the *St. Tudwal* by Mrs. Lewis, of Bangor.

**Lady Olivia.**—On Tuesday, August 20th, Messrs. Wm. Gray & Co., Limited, launched the fine steel screw steamer, *Lady Olivia*. She is of the following dimensions, viz.:—Length over all, 275 ft.; breadth, 37 ft. 6 in.; depth, 18 ft. 6 in.; and has been built to the order of the Shipping Agency, Limited, of London. She will take Lloyd's highest class, and the deck erections consist of poop, raised quarter-deck and partial awning deck. A handsome saloon, state-room, and accommodation for captain and officers will be fitted up in the poop, and comfortable quarters for the engineers at the after end of the bridge and for the crew in the fore-castle. The hull is built with web frames, a double bottom is fitted under each hold for water ballast, and there is also a large ballast tank in the after peak. Four steam winches, donkey boiler, steam steering gear amidships, screw steering gear aft, patent windlass, schooner rig, boats on beams overhead, grain shifting boards throughout, and all modern appliances will be fitted. The engines are of the triple-expansion type working on three cranks. They are supplied by the Central Marine Engine Works of Messrs. William Gray & Co., Limited. The cylinders are 19 in., 30½ in., and 51 in. diameter, and the piston stroke 36 in. The boilers, built of steel, are of large size, and will give an ample supply of steam at a working pressure of 160 lbs. per square inch. The vessel has been superintended during construction by Mr. Kitching, of West Hartlepool, on behalf of the owners, and the ceremony of naming her *Lady Olivia* was gracefully performed by Miss Florence Engleau Lavington, Llansillen, Marlborough, Wiltshire.

**Aries.**—On Thursday, August 22nd, Messrs. Wm. Gray & Co., Limited, launched the fine large steel screw steamer *Aries*, which they have built to the order of Messrs. Rickinson, Son & Co., of West Hartlepool. She is a sister ship to the *s.s. Argo*, which the builders have recently completed for the same owners. She will take Lloyd's highest class, and is of the following dimensions, viz.:—Length, over all, 336 ft.; breadth, 47 ft.; depth, 24 ft. 10 in.; and the deck erections consist of a half poop, bridge over the machinery space, and a topgallant fore-castle. A handsome saloon and state-rooms, together with the captain's and officers' rooms will be fitted under the poop. The hull is built with web frames and cellular double bottom for water ballast. Six steam winches, steam steering gear amidships and screw gear aft, patent direct steam windlass, patent donkey boiler, steel longitudinal grain divisions, stockless anchors and a complete outfit will be fitted for a first-class cargo boat. Fine engines on the three-cylinder triple-expansion principle are being supplied by the Central Marine Engine Works of William Gray & Co., Limited. They will develop over 1,200 H.P. The cylinders are 24 in., 38 in., and 64 in. diameter, with a piston stroke of 42 in., and fine extra large steel boilers, having a pressure of 160 lbs. per square inch will give an ample supply of steam. A special feature, also, is the adoption of Messrs. Kitching & Smith's improved stern tube and propeller shaft arrangement which prevents the rapid deterioration of the shaft that occurs in

ordinary circumstances. The construction of the ship and machinery have been under the superintendence of Mr. Chas. E. Smith on behalf of the owners, and the ceremony of christening the *Aries* was gracefully performed by Miss Constance Rickinson, of West Hartlepool.

**Ralph.**—On Thursday afternoon, August 22nd, there was launched from the yard of Messrs. Robert Thompson & Sons, Southwick, Sunderland, a small steamer for the south coasting trade. Length, between perpendiculars, 110 ft.; breadth, 20 ft.; depth, moulded, 9 ft. 8 in. Class 100 A1, with raised quarter deck, bridge for captain, officers', engineers' and mess room; crew being berthed in the fore-castle. One large hatchway 31 ft. long, with powerful steam winch for rapid loading and discharging of cargo. The engines and boiler are by the North-Eastern Marine Engineering Co., Limited, of Sunderland. During construction the vessel and engines have been under the personal supervision of Mr. Hanna on behalf of the owners. As the vessel left the ways she was gracefully christened the *Ralph* by Miss Lowes.

**Grand Duchess Xenia.**—On August 22nd Messrs. William Dobson & Co. launched from their yard at Low Walker a steel twin-screw steamer, built to the order of the Archangel-Mourman Steam Navigation Co., of Archangel, for mail, passenger, and cargo service in the Arctic and White Seas. The dimensions are:—Length, 219 ft.; breadth, 28 ft.; depth, 21 ft. 6 in. The steamer has been built to the highest class at Lloyd's as an awning-deck vessel, with flush deck all fore and aft, and with clipper stem and figurehead. The deck machinery consists of a steam windlass, four steam cranes, steam winch and steam warping capstan, and steam steering gear. The machinery consists of two sets of triple-expansion engines, each set having cylinders 12½ in., 20 in., and 38 in. by 24 in. stroke, steam being supplied by two single-ended boilers. On leaving the ways the steamer was named *Grand Duchess Xenia* by Miss Zerafina Popoff. After the launch the steamer proceeded to the works of the North-Eastern Marine Engineering Co., Limited, of Wallsend, to ship her machinery.

**Sokol.**—On August 22nd there was launched by Messrs. Yarrow & Co., at Poplar, the new torpedo-boat destroyer *Sokol*, which has been built by that firm for the Russian Government. This vessel, which is 190 ft. long, 18 ft. 6 in. beam, and has a displacement of about 240 tons, is the first destroyer in which nickel steel has been adopted as the material of construction, it being estimated that it has about 30 per cent. greater strength than the mild steel usually employed. She is fitted with twin-screw triple-expansion engines to indicate about 4,000 H.P., and estimated to give her a speed of 29 knots, the steam for driving them being supplied at a pressure of 200 lbs. per square inch by eight Yarrow water-tube boilers. The *Sokol* was launched with engines, boilers, and all auxiliary machinery in place, and within an hour from taking the water had steam up and her engines in motion.

**Pinnars Point.**—There was lately launched by Messrs. Thompson & Sons, at Sunderland, a steel steamer, built to the order of the Norfolk and North American Steam Shipping Co., Limited, for their service between Liverpool and Norfolk (Va.), &c. The principal dimensions of the ship are:—Length between perpendiculars, 358 ft.; breadth, 45 ft.; depth, moulded, 30 ft.; built under Lloyd's survey for their highest classification. She will have a deadweight carrying capacity of about 6,000 tons. The engines are of the triple-expansion type, having cylinders 26 in., 45 in., and 70 in. diameter respectively, with a stroke of 48 in., and are being fitted by Messrs. Dickinson & Sons, Limited. The vessel was named *Pinnars Point*.

#### LAUNCHES.—SCOTCH.

**Ralth.**—On July 18th a steel screw steam lighter of about 92 tons gross, named the *Ralth*, was launched at Kinghorn; owned by the Kirkcaldy, Leith and Glasgow Steam Packet Co., of Kirkcaldy.

**Foochow.**—On July 25th Messrs. Scott & Co. launched at Greenock a steel screw steamer of 1,950 tons, named the *Foochow*, for the China Steam Navigation Co. The vessel's dimensions are as follows:—Length, 250 ft.; breadth, 38 ft.; and depth, 26½ ft. She will be supplied with engines of 1,500 I.H.P.

**Penrhyn.**—On Saturday forenoon, August 3rd, Messrs. Scott & Sons, Bowling, launched from their shipbuilding yard

a screw-steamer of dimensions 145 ft. by 24 ft. by 11 ft. 2 in., and she will carry a cargo of 420 tons on 10 ft. draught, and steam loaded at about 10 knots. Built to the order of the Anglesey Shipping Co. for their North Wales slate trade. The engines, which are compound surface-condensing, are being supplied by Messrs. Ross & Duncan, Govan. On moving down the ways the steamer was named *Penrhyn* by Mrs. William Campbell, Fernlea, Paisley.

**Lizard.**—On August 6th there was launched from Messrs. W. B. Thompson's shipbuilding yard, Dundee, a steel screw steamer named the *Lizard*, of about 1,200 tons gross register, built for the Clyde Shipping Co., Glasgow. The principal dimensions of the vessel are:—Length, 255 ft. 6 in.; breadth, 33 ft. 6 in.; and depth in hold, 16 ft. 3 in. The *Lizard*, which has been built to the rules of the British Corporation, is intended for the company's London and Glasgow trade. Accommodation is provided for 80 first-class passengers aft and amidships. Throughout the vessel is lit by electricity, the installation having been fitted by Messrs. W. C. Martin & Co., Glasgow. There are 158 fixed lights of 16-candle power; while two cargo clusters, each of 400-candle power, are swung from aloft for use in working the cargo. The engines are of the triple-expansion type, having cylinders of 23 in., 38 in., and 61 in. diameter respectively, with a piston stroke of 48 in.

**Vimeira.**—On August 6th there was launched from the yard of the London and Glasgow Engineering and Iron Shipbuilding Co., Limited, Govan, a steel screw steamer for Messrs. Allan C. Gow & Co., Glasgow. The dimensions of the vessel are:—Length, 300 ft.; breadth, 42 ft.; depth, moulded, 22 ft.; deadweight carrying capacity, about 4,100 tons. The new vessel has been designed to embrace the latest improvements in cargo steamers, with special regard to the grain-carrying trade, in which she will be largely engaged, and is in all respects constructed to Lloyd's rules for the highest class. The engines, also supplied by the builders, are triple-compound, having three cylinders—23 in., 37 in., and 61 in. diameter by 42 in. stroke; one single-ended boiler, having four furnaces, with a working pressure of 160 lbs., and having Howden's system of forced draught. The winches and windlass are by Messrs. Clarke, Chapman & Co., and the steam steering gear by Messrs. Caldwell & Co., Limited. The ship and engines have been built under the special direction of Mr. George Macfarlane. As the vessel entered the water she was gracefully named the *Vimeira* by Miss Gow, of Hayston, Kelvinside. After the launch the builders entertained a large party to lunch. Among those present were:—Mr. Reid, of Kilmardinney, chairman of the directors, who presided; Mr. Leonard Gow, Jun., of Messrs. Allan C. Gow & Co.; Mr. William Gow, Miss Gow, and Mr. George Macfarlane; Mr. James Reid, Mr. Shephard, Mr. Hughes, Mr. Morison, and Mr. Boyd, of the London and Glasgow Co.; Miss Brown, of New York; Mr. and Mrs. N. H. Dunlop, Mr. C. E. Stewart, Admiralty overseer; Mr. W. T. Hoeken, chief engineer of H.M.S. *Isis*, at present under construction in the yard; Captain Hamilton, Govan, and others.

**Octopus.**—On August 6th there was launched complete from the yard of Wm. Simons & Co., Limited, Renfrew, to the order of the Agent-General for Natal for the port of Durban, the sand-pump hopper dredger *Octopus*, one of the most powerful pumping dredgers afloat. This vessel has a hopper capacity for 1,300 tons of dredgings, and is constructed to Lloyd's highest class, and specially strong for the exceptional character of the work it has to do. The hull is divided into nine watertight compartments by means of bulkheads extending up to the main deck, and the principal dimensions are:—Length, 215 ft.; breadth, 36 ft. 6 in.; depth, 15 ft. 9 in. The centrifugal sand pumps, two in number, are fitted at forward end of hopper in a separate compartment. They are capable of raising 3,000 tons of sand per hour, and working to a depth of 40 ft. under water level. They are driven by two sets of independent triple-expansion engines. The pumps are capable of discharging on shore a distance of 3,000 ft. through pipes. Provision is also made by which the dredgings can be discharged into barges alongside. By means of hydraulic gear placed in a central well in the forepart of the vessel, the lifting of the suction-pipe is performed in a very speedy manner. The pipe is attached to the hull of the dredger by a novel arrangement of swivelling gear for preventing damage when they are at work in exposed places. The propelling engines are two sets of the triple-expansion type, of 1,250 I.H.P.,

driving twin propellers, with a speed of 9½ knots per hour. The diameters of the cylinders are as follows—High pressure 15½ in., intermediate 24½ in., low pressure 39 in., stroke 24 in. Steam is supplied by two steel boilers, constructed to Board of Trade and Lloyd's requirements for a working pressure of 160 lbs. per square inch. The hopper doors are worked by hydraulic power. At the bow a powerful steam winch is fitted for working the anchors and cables, besides which there are steam capstans forward and aft to work the mooring chains. Special attention has been given to the ventilation of the cabins, and separate accommodation has been provided for the native portion of the crew. The vessel is fitted with a complete electric light installation, and built under the direction of Mr. Cathcart W. Methven, M.Inst.C.E., Messrs. Knipple & Jaffrey, of Westminster, acting as consulting engineers. The christening ceremony was performed by Miss Booth, daughter of the resident inspector, Mr. A. P. Booth, Durban. The *Octopus* is the sixth dredging steamer built by Messrs. Simons for the Government of Natal.

**Gwennie.**—On August 7th Messrs. John Cran & Co. launched a steel screw tug for the Manchester Ship Canal Co. Her dimensions are 58 ft. keel, 13 ft. beam, 7 ft. 3 in. depth of hold. She is propelled by compound surface-condensing engines of 120 H.P., supplied by the builders. As she left the ways she was christened *Gwennie*. Her sister ship, the *Minnie*, for same owners, went on trial on the Forth same day, and developed a speed of 11 miles.

**Emperor Nicholas II.**—On August 10th there was launched by Messrs. Denny, at Dumbarton, a steel screw steamship of the following dimensions:—390 ft. by 45 ft. by 30 ft. and of about 4,000 tons gross register. On leaving the ways she was named the *Emperor Nicholas II.* by Madame Witt, wife of the superintending engineer of the company. The vessel has been built to the order of the Russian Steam Navigation and Trading Co., of Odessa, and will be used for their general trade.

**Peveril.**—On August 10th there was launched by Messrs. Scott & Sons, at Bowling, on the Clyde, a screw steamer, 135 ft. by 28 ft. by 11 ft., built to the order of Messrs. Wm. McLachlan & Co., Bridgegate, Glasgow, for their fish trade. The engines, which are compound surface-condensing, are being supplied by Messrs. Muir & Houston, Glasgow. The steamer was named *Peveril* by Miss Mary Gallacher, Queen's Square, Strathbungo. The *Peveril* is the fifth steamer built at Bowling for Messrs. McLachlan.

**Pakhoi.**—On August 12th Messrs. Scott and Co. launched at Greenock a steel screw steamer, named the *Pakhoi*, for the China Steam Navigation Co., Limited. Dimensions: Length, 256 ft.; breadth, 33½ ft.; depth 21 ft.; and of 2,030 tons gross. The builders will supply triple-expansion engines of 1,500 H.P.

**Thistle.**—On August 15th Messrs. Wm. Hamilton & Co. launched from their Glen Yard, Port-Glasgow, a sailing ketch for service on the Thames and English Channel. The following are the dimensions:—Length, 86 ft.; breadth, 19 ft. 6 in.; depth, moulded, 7 ft.; gross tonnage, 110 tons. The vessel is to have a large spread of canvas, the lower mast being 43 ft. from deck to head, and the top mast 46 ft. Instead of the mainsail with gaff and boom, as is usual on the Clyde, a sprit sail is used, the sprit being 62 ft. in length with a large gaff topsail surmounting. Lee-boards are fitted on each side, which are lowered into the water to prevent the vessel going to leeward, and act the same as the centre-boards fitted in American yachts. The masts are made to lower to go under the bridges on the Thames. The vessel has been built to the order of Mr. Henry Covington, of Battersea Wharf, London, who has a large fleet of these vessels sailing between London and Continental ports, and she is the first of the type built on the Clyde. On leaving the ways she was named *Thistle*, and is registered in Glasgow.

**Dayspring.**—On August 19th the steam auxiliary ship *Dayspring*, built for the service of the New Hebrides Mission, was launched by Messrs. Mackie & Thomson at Govan. The vessel's length over all is 157 ft. by 23 ft. broad by 11 ft. deep, moulded, with raised quarter-deck aft, long bridge amidships, and top-gallant fore-castle. The engines are placed aft, and are to be fitted by Messrs. Hall-Brown, Buttery & Co., of Govan. They will be triple-expansion surface-condensing, having cylinders 10 in., 16 in., and 26 in., by 21 in. stroke.

**Oceana.**—On Thursday afternoon, August 22nd, Messrs. Alex. Stephen & Sons launched from the ~~the~~ <sup>house</sup> a steel screw steamer of the ~~the~~ <sup>house</sup>

28 ft. 9 in., built to the order of Messrs. MacLay & McIntyre, of Glasgow, and which is the twelfth steamer constructed by Messrs. Stephen for same owners. The vessel has been constructed under Lloyd's special survey to their highest class of 100 A1 three-deck rule, having heavy side framing and longitudinal intercostals in lieu of hold beams and stringers, thus leaving large unobstructed holds for the stowage of cargo of the bulkiest kind. The deck erections consist of poop, bridge-house, and topgallant forecastle. She has a double bottom on cellular principle for water ballast, four long hatchways, five steam winches, steam windlass, steam steering gear, and all the latest and most approved appliances for the efficient handling of ship and cargo. She will be rigged as a two-masted fore-and-aft schooner with telescopic topmasts to suit Manchester Canal. Accommodation is provided in house on bridge-deck for saloon, captain's room and spare rooms; while the officers and engineers are located under the bridge-deck at after end, all the spaces being fitted up in a substantial and comfortable manner, the crew, as usual, being berthed in topgallant forecastle. Her engines, also constructed by Messrs. Stephen, are of the most improved triple-expansion type, having cylinders 24 in., 39 in., and 64 in. diameter respectively, by 42 in. stroke, and will be supplied with steam from two single-ended steel boilers suitable for a working pressure of 175 lbs. As the vessel left the ways she was named *Oceana* in the orthodox manner by Mrs. A. J. Topham, Holkham, Norfolk.

**Prins Hendrik.**—On August 22nd the Fairfield Shipbuilding and Engineering Co., Limited, launched from their yard at Govan, a steel paddle steamer of 2,000 tons gross, named the *Prins Hendrik*, which they have built to the order of the Zealand Steamship Co., Flushing. The *Prins Hendrik* is the last of three similar vessels which have been built at Fairfield for the Zealand Co., all of which are alike in their dimensions, fitting-out, machinery, and general appearance. They are intended for mail and passenger traffic between Queenborough and Flushing. The dimensions of each are:—Length between perpendiculars, 320 ft.; breadth, moulded, 35 ft. 6 in.; depth, moulded to upper deck, 24 ft. The engines, also by the builders, are triple-expansion, and are supplied with steam by six large single-ended boilers of the ordinary multitubular type, constructed for a working pressure of 170 lbs. Six boats and a full complement of life-saving appliances, equal to British Board of Trade rules, have been supplied to each of the vessels. There was a large party present at the launch, and the christening ceremony was performed by Miss Tak Van Poortliet. Afterwards the builders entertained the party to lunch, Sir Wm. G. Pearce, chairman of the Fairfield Co., presiding. Among the others present were—Sir Wm. T. Marriot, director of the Fairfield Co., and Mr. Richard Barnwell, managing director; Mr. Van Woelderren, managing director of the Zealand Steamship Co., and Mrs. Van Woelderren; Mr. Cluysenaar, of the Dutch States Railways; Mr. Teding Van Berkhout, Miss Tak Van Poortliet and friend, Mr. and Mrs. G. Sneath, and Master Claude Sneath, of London; Mr. Harding and Mr. Meadus, of the Admiralty; Mr. George Scott and Mr. R. M. Munn, of Messrs. Donald Currie & Co.; Mr. H. Timmins; Mr. Sharer, of the Fairfield Co.; Mrs. Sharer, and others. The Chairman, after the toast of "The Queen-Regent of Holland and young Queen" had been honoured, proposed "Success to the *Prins Hendrik*." One of his earliest recollections was, he said, the friendship that existed between Prins Hendrik and his (the chairman's) father. Prins Hendrik was the inaugurator of steamship enterprise in Holland and took a keen interest in its after-welfare. That period of his father's life when associated with Prins Hendrik and the Zealand Co. had been one of great pleasure and, he believed, of considerable mutual gratification. It was therefore a source of great satisfaction to them that this new vessel had been named after Prins Hendrik. In Mr. Van Woelderren the company had one who faithfully carried out its traditions in every respect. The Fairfield Co. had now built ten steamers for the Zealand Co., and he trusted that this, the latest, would follow in the track of the others and prove as great a success. She would, he believed, hold her own in the Channel, and with a speed of 20 knots would conduce to make the passage between Flushing and Queenborough more comfortable even than it was. There was room nowadays for improved fast services, and the Zealand Co. had seized the opportunity, and were putting on boats that would be equal to all the requirements. Mr. Van Woelderren, in replying to the toast, expressed his gratitude to Sir William Pearce for his references to the Zealand Co. They

had always had full confidence in the Fairfield Co., and the vessels built by them had always been successful.

**Jules-Michael.**—On August 22nd there was launched from the yard of Messrs. Hawthorn & Co., Leith, a finely modelled screw steam trawler of an improved type. This vessel has been built to the order of Mr. J. Baels-Maurix, Ostend, and is the fourth which the firm has constructed for him. She will be fitted by the builders with triple-expansion engines, having cylinders 11 in., 17½ in., and 30 in. diameter, by 21 in. stroke, working at a boiler pressure of 160 lbs. As she left the ways she was christened *Jules-Michael* by Miss Herdman, Trinity.

**Morven.**—On August 22nd Messrs. Charles Connell & Co., Whiteinch, launched from their Sootstown shipbuilding yard a large steel screw steamer, built to the order of Messrs. James Gardiner & Co., shipowners, Glasgow. Her dimensions are:—Length, 344 ft.; breadth, 44 ft. 6 in.; depth, moulded, 28 ft. 6 in., with a deadweight capacity of about 5,800 tons. She has been built to Lloyd's highest class as a three-deck steamer, with a full poop, bridge, and topgallant forecastle, also cellular double bottom right fore and aft for water ballast. Each hatch is equipped with winches and derricks, completely arranged for speedy loading and discharging; while she is fitted with a powerful steam windlass, Muir & Caldwell's combined steam and hand steering-gear, and all the most recent appliances for the safety and efficient working of the vessel. The engines, which are of the most approved triple-expansion type, having cylinders 25 in., 40 in., and 66 in. diameter by 45 in. stroke, worked by two single-ended boilers, 14 ft. 10 in. diameter by 11 ft. 6 in. long, fitted with Howden's forced draught, are being constructed by Messrs. Dunsmuir & Jackson, Govan. As the steamer left the ways she was named *Morven* by Miss Robinson, Clydevue House, Partick.

**Iverna.**—On August 22nd there was launched from Messrs. A. & J. Inglis's shipbuilding yard at Pointhouse, the paddle steamer, *Iverna*, built to the order of the Drogheda Steam Packet Co., Limited. The dimensions are:—Length, over all, 265 ft.; breadth, over paddle-boxes, 55 ft.; and depth, 25 ft. She is being fitted up in a superior style for first-class passengers aft, and for steerage passengers forward, and will have all the latest improvements for the convenience of passengers and crew, including electric light, &c. The vessel will be fitted by the builders with triple-expansion engines of the most improved description. The naming ceremony was gracefully performed by Mrs. A. Westland Archer, of Drogheda. Immediately after the launch the vessel was taken to the builders' shearlegs to have the engines and boilers put on board. This ship is intended for the passenger and cattle trade between Drogheda and Liverpool.

**Rio Pauhin.**—On August 22nd there was launched from the yard of Messrs. Murdock & Murray, Port-Glasgow, a steel twin-screw steamer of the following dimensions:—160 ft. by 33 ft. by 17 ft. 4 in. to awning deck. The vessel is intended for passenger and cargo service on the River Amazon, and is classed in Lloyd's register. On leaving the ways the vessel was named *Rio Pauhin* by Mrs. William M. Wilson, of Liverpool. The engines will be fitted on board by Messrs. David Rowan & Son, Glasgow.

**East Neuk.**—On August 22nd Mr. Jarvis launched from his yard at Anstruther a steam liner, built to the order of Crail shareholders. The vessel was named the *East Neuk* by Mrs. Cairns, of Ashburn. The liner is the largest of the fleet of steam vessels launched at Anstruther, the dimensions being:—Length, 96 ft.; length of keel, 90 ft.; breadth, 19 ft. 2 in.; depth, 10 ft. 9 in. She is fitted with ice and fish rooms, and fully equipped for the deep-sea fishing trade.

#### LAUNCHES—IRISH.

**Armenian.**—On July 25th Messrs. Harland & Wolff, Belfast, launched a large screw steamer for Frederick Leyland & Co., Limited, Liverpool, intended for the Liverpool and Boston trade. She is the second of three being built by them, the first, the *Victorian*, having been launched on 6th July. She is 512 ft. long, 8,780 tons register, and will class 100 A1 at Lloyd's; will have four masts, schooner rigged, and be fitted with all the most approved appliances. Her triple-expansion engines have been constructed by Harland & Wolff. She was christened *Armenian* by Mrs. Walter Glynn, wife of the managing director.

**American.**—On August 8th Messrs. Harland & Wolff launched at Belfast the steel twin-screw steamer *American*, built to the order of the West Indian and Pacific Steamship Co., Limited, and intended for their Liverpool and New Orleans service. The vessel is 475 ft. in length, and her tonnage is about 3,186. Her machinery consists of two sets of triple-expansion engines. She will have four pole masts, the usual derricks, steam winches, and everything calculated to expedite the handling of cargo; she will also have a complete installation of electric light.

#### LAUNCH—GERMAN.

**Alfred Mensell.**—On July 17th a new steel screw steamer was launched from the yard of the Flensburg Shipbuilding Co., with following dimensions:—240 ft. by 34 ft. 2 in. by 17 ft. 6 in. She is classed to Bureau Veritas and built for Mr. H. Schultdt, Flensburg. At the launch the vessel was christened by Miss Helene Schultdt.

#### TRIAL TRIPS.

**Australasian.**—On Saturday afternoon, July 18th, the s.s. *Australasian* left the Clyde for London, after having her passenger accommodation renewed and extended by her builders. Built by Messrs. B. Napier & Sons about a dozen years ago for Messrs. George Thompson & Co.'s Aberdeen line to Australia, the ship has become such a favourite that the owners determined to double her passenger accommodation, and three weeks ago the vessel left London for Glasgow. In that short time the whole of her former fittings were removed and luxurious accommodation supplied for fifty first-class passengers. This consists of a handsome dining-saloon, finished in polished birdseye maple with a mahogany dado, fluted pilasters, and carved capitals, and furnished with sideboards, bookcases, revolving chairs, &c., a special feature being an open fireplace, which gives the saloon a cosy and homelike appearance. An oval well, surrounded by a very artistic balustrade in mahogany and satinwood, is open to the music-room above, and a large skylight affords abundance of light and ventilation; the walls of the music-room are of selected birdseye maple and satinwood, with inlaid flower subjects on the panels and round the large side-lights (the sofas being upholstered in blue and gold moquette), making a very bright and artistic apartment, which will be much appreciated on the long Australian voyage, while abaft a comfortable smoking-room in polished mahogany, with settees, tables, &c., forms a snug retreat. The state-rooms on the main deck are exceptionally large and fitted with the most modern appliances for the comfort of the passengers (including folding washstands, wire-woven mattresses, tapestry, sofa cushions, &c.), with two very complete sets of baths and lavatories at the forward end of the wide and well-lighted corridors, and a very complete installation of electric lighting has been fitted throughout the vessel. With her outwater bow and smart three-masted rig the *Australasian* has a most symmetrical appearance, having the look of a large steam yacht; and the passenger accommodation compares favourably with the limited space in some mail steamers. On the arrival of Sir Wm. Henderson and party from Aberdeen the vessel left for London, and sailed for Australia on July 25th., the alterations having been carried out so quickly that the ship has not lost any time, and takes up her usual turn in the company's service.

**Flensburg.**—On July 20th the new steamer *Flensburg*, built for the Hamburg Austral Shipping Co. by the Flensburg Shipbuilding Co., was taken on trial. This vessel is classed 100 A1 British Lloyd's and has dimensions:—373 ft. by 46 ft. 2 in. by 30 ft. 10½ in. Her engines are built on the triple-expansion system, 1,800 H.P. The average speed on the trial was 13 knots. At the dinner party on board a flag of embroidered silk, with the Flensburg wappen, was handed over to the owners by Mr. Toesbye, the burgomaster of Flensburg, with thanks for giving the ship the name *Flensburg*.

**Titania.**—On July 23rd a satisfactory trial trip was made with the new steamer *Titania*. The vessel has been built by Messrs. Bartram, of Sunderland, to the order of Messrs. C. Howard & Sons, of London. She is of the spar-deck type, with poop, long bridge, and topgallant forecastle, and is of the following dimensions:—Length, 350 ft.; breadth, 45 ft.; depth, 26 ft. 9 in.; gross tonnage, 8,480 tons. She has been built to take

highest class in Lloyd's Registry, under the personal supervision of Mr. James Pollock, of London. The engines are by Messrs. Dickinson, and fitted with Howden's system of forced draught. The cylinders are 24 in., 39 in. and 64 in., and the stroke 42 in. The vessel made several runs over the measured mile off the Northumberland coast, and attained a speed above that specified. The vessel proceeded directly afterwards on her voyage to Cardiff to load for the Cape and Australia.

**Christiania.**—On July 24th the trial trip of the s.s. *Christiania*, built by the Elsinore Iron Shipbuilding and Engineering Co., Elsinore, Denmark, to the order of Messrs. Jens Hennich & Co., Christiania, took place in the Sound, and was considered very satisfactory. This steamer is built of steel to the highest class at Norwegian Veritas "special survey," and her dimensions are 180 ft. by 27 ft. 6 in., by 12 ft. 8½ in. depth of hold. The engines are of the triple-expansion type, with surface condenser. During the trial trip the engines indicated 1,175 H.P., the result being a speed of 18½ knots with a very moderate consumption of coal.

**Saba.**—On July 24th the new screw steamer *Saba*, built to the order of Messrs. Scrutton, Sons & Co., London, by Messrs. John Readhead & Sons, South Shields, was taken on her trial trip off the Tyne. The vessel is of the following dimensions:—Length, 306 ft.; breadth, 41 ft.; depth, moulded, 25 ft. 7 in.; and is classed 100 A1 at Lloyd's under special survey. The engines, also built by Messrs. John Readhead & Sons, are of the triple-expansion type, having cylinders 25 in., 40 in. and 65 in. by 42 in. stroke, supplied with steam by one large steel boiler fitted with Howden's forced draught, working at a pressure of 160 lbs. per square inch. The vessel is intended for the West Indian trades, and has been built under the superintendence of Mr. H. Barringer, superintendent engineer to the owners, and Captain Norris. After the compasses had been adjusted, the vessel steamed north and south, her speed, &c., being thoroughly tested over the measured mile, and 12½ knots being attained. The engines worked admirably, the trial being successful and satisfactory to all concerned. Among the company present were Mr. James Readhead, Mr. John Readhead, Mr. Barringer, Mr. Thomas Sheriff, Mr. William P. Henry, Mr. Pitt (Lloyd's representative), and Captain Norris, who will take command. After the trial the vessel proceeded to London to load.

**La Rapide.**—On July 25th the official trial took place on the Clyde of the *La Rapide*. The vessel obtained a mean speed of 21·843 knots during a continuous run of three hours. This speed will enable the steamer to effect the passage from Dover to Ostend in three hours. The Cockerill Co., of Belgium, the builders and engineers of the steamer, have again produced a vessel which has exceeded her contract speed by nearly half a knot, and are thereby entitled to a very large premium. The new steamer is 300 ft. long, 38 ft. broad, and 21 ft. deep, and is fitted with engines of 7,000 H.P. Great taste has been exercised in all the fittings and decorations. Flemish art has been called in to assist in making the saloons and cabins examples of the high state of decoration prevalent in the 14th and 15th centuries. Beyond a long range of private cabins there is a suite of apartments specially fitted for the use of the King of the Belgians and other foreign royal personages, who patronise this line in preference to all others. In the King's saloon the decorations and fittings are of beautiful polished woods and ivory from the Congo, the upholstery even being an adaptation and exemplification of Central African arts. Handsome ivory tusks are used for the electric light pendants.

**Borneo.**—On July 26th the s.s. *Borneo*, built by Messrs. Palmers' Shipbuilding and Iron Co., Limited, to the order of the Peninsular and Oriental Steam Navigation Co., was taken to sea for her official steam trial. Her dimensions are as follows, viz.:—Length, between perpendiculars, 400 ft.; beam, 46 ft. 6 in.; moulded depth, 31 ft. The vessel is of the three deck type with poop, bridge, and forecastle, and has been built under special survey to class 100 A1 at Lloyd's, and to comply with the Admiralty requirements for transport service. The upper and main decks are of steel and wood sheathed all fore and aft, and the lower deck is laid throughout the cargo holds. A double bottom is fitted on the cellular system for water ballast, extending all fore and aft, and the hull is subdivided by a large number of watertight steel bulkheads. Spacious  
to sixty first-class passengers is provided and is handsomely and comfortably

fitted, and ventilated throughout in a manner suitable for service in warm climates. Comfortable accommodation is fitted in the poop for forty to fifty second-class passengers. The officers and engineers are berthed along the sides of the bridge house, and the crew in the topgallant forecabin. The vessel is fitted with all the most modern improvements, including steam cranes, winches, &c., for rapid loading and discharging, and is lighted throughout by electricity. She is designed to load about 6,000 tons deadweight on Lloyd's summer freeboard. The P. & O. Co. were represented on board by G. W. Manuel, Esq., and Capt. Wibmer.

**Ozar.**—On July 27th the trial trip of this vessel took place and presents some features of interest beyond the circle of those immediately concerned. The vessel was built in the year 1883, for the Russian Steam Navigation and Trading Co. by Messrs. C. Mitchell & Co., of Low Walker, and fitted with compound engines by the Wallsend Slipway and Engineering Co. After doing good service for twelve years, the company decided early this year to remove the old compound engines and boilers, and to fit triple-expansion machinery of the most modern type. The order for the new machinery was placed in the hands of the Slipway Co. at the close of February, 1895, by Mr. B. Hausmann, engineer-in-chief of the Russian Steam Navigation Co., the contract providing that the vessel was to be ready for sea at the end of July. This contract has been successfully carried out, and as stated above, the trial trip was held with great success on July 27th. It consisted of a continuous run for six hours, during which time the machinery was kept at full speed, indicator diagrams were taken every half-hour, and the conditions of the trial were stringently carried out, as is usual with new vessels of this well-known company. With a mean draught of 19 ft. 1 in. the average speed obtained was 18 knots, with an I.H.P. of about 1,800, and during the whole of the time the machinery worked without any stoppage or hitch of any kind whatever. It may be interesting to remark that in 1883, with a mean draught of 20 ft., with engines developing about 1,600 I.H.P., a speed of 11½ knots was obtained, the present increase in speed being no doubt due in some measure to the greater efficiency of the modern triple-expansion engines. The engine-room is fitted out with many of the most recent improvements in machinery, such as Kirkaldy's feed heater and evaporator, Harris's feed filter, Horne's patent feed pumps, and Durham, Churchill & Co.'s patent governor and controlling gear, all of which were thoroughly tested by the Russian representatives, Mr. Nevins and Captain Vetlinsky, during the progress of the trial. We are glad to learn that the Wallsend Slipway Co. have also in hand two other vessels for the same company, which are to be fitted with new engines and boilers, and in addition the ships are to be considerably altered and adapted to the modern requirements of the present day.

**Salmon.**—On July 29th the new torpedo-boat destroyer *Salmon*, built and engined by Earle's Shipbuilding and Engineering Co., Limited, Hull, went for her official trials over the Maplin course with very successful results. The average speed on the mile was 27.88 knots, while the mean of the three hours' run was 27.6 knots, the power developed being 8,589 I.H.P. with an air pressure equal to 2.62 in. of water, and steam at boilers 177 lbs. per square inch. The boilers are of the Yarrow water-tube type, and the engines, which were run at an average of 355 revolutions per minute, worked very smoothly and without heating or undue vibration.

**Sunfish.**—On August 1st the *Sunfish*, torpedo-boat destroyer, which has been designed, built, and engined by Messrs. R. & W. Hawthorn, Leslie & Co., Limited, had her second preliminary trial prior to leaving for Chatham. The mean speed attained, with full load on board, on six runs was 27.24 knots, with an air pressure of 2½ in., revolutions 340. The vibration was slight. The officials superintending the trial on behalf of the Admiralty were Messrs. W. J. Harding, R.N., and A. Aslett, R.N. The vessel is fitted with boilers of the "straight through" or Yarrow type, and both machinery and boilers worked splendidly.

**Avery Hill.**—On August 2nd the new steamer *Avery Hill*, which was launched a few weeks ago from the yard of Messrs. Short Bros., at Sunderland, was sent on her trial trip. Her dimensions are:—Length, 351 ft.; breadth, 42 ft.; depth, moulded, 28 ft. 1½ in.; and she has been built to the order of the Nitrate Producers' Steamship Co., Limited, of which Messrs. Lawther, Latta & Co., London, are the

managing owners. The engines, which have cylinders of 24½ in., 40 in., and 66 in. by 45 in. stroke, are by Messrs. George Clark, Limited. After adjusting compasses the vessel was run over the measured mile, and a speed of 10 knots was attained, which was considered satisfactory. After the trial the steamer at once proceeded on her voyage to Genoa.

**Catania.**—On August 8th the beautiful steam yacht *Catania*, of about 700 tons, recently completed for the Duke of Sutherland by Messrs. D. & W. Henderson, performed her trials on the Clyde, when a mean speed of about 14 knots was attained. The *Catania*, which is from the designs of Mr. G. L. Watson, is a smart-looking vessel, with white painted hull, and large promenade deck.

**Acacia.**—On Saturday, August 10th, the fine steel screw steamer *Acacia*, the latest addition to the fleet managed and owned by Messrs. J. Lilly & Co., West Hartlepool, went on her trial trip. There was a large company of gentlemen on board, some of whom are financially interested in the vessel. Amongst those present were Captain J. Lilly (managing owner), Captain John Wood, Messrs. R. Hardy, W. Runciman, Ley Chalton, C. A. Foralind, W. Grier, J. Whitfield, J. Hunter, M. Harrison, R. Blacklin, F. H. Bennett, J. E. Guthe, J. Warwick, T. Cattle, T. N. Alexander, W. Peat, and W. T. Walton. The vessel was fully laden with a cargo of coals bound for Genoa. The party joined the steamer off the mouth of the Tyne, and all safely on board, the vessel was run over the measured mile and attained a speed of 9 knots on a consumption of 11½ tons of coal per day, which was highly satisfactory to both the owners and builders. The toast of "The Owners; success to the *Acacia*," was drunk and heartily responded to. Captain Lilly then gave the toast of "The Builders," which was responded to by Mr. Clark, the representative of the engine builders. "Captain Mawer," the master of the *Acacia*, was next cordially drunk to, and responded briefly. After a pleasant run from the Tyne to Hartlepool Bay the party were landed by the steam tug *Iron*; and as the *Acacia* and the tug parted company three hearty cheers were given for the captain and crew of the *Acacia*, and they were as heartily responded to by the crew of that vessel, which then turned about and set her course for Genoa.

**Vagliano.**—On Monday morning, August 12th, the new steamer, *Vagliano*, left the river for her official trial at sea. She has been built by Messrs. Robert Thompson & Sons, Southwick Yard, Sunderland, and her dimensions are:—Length between perpendiculars, 310 ft.; breadth, 41 ft. 3 in.; depth, moulded, 21 ft. 2½ in. The engines are of the triple-expansion type by Messrs. John Dickinson & Sons, Limited, having cylinders 28 in., 37 in., and 60 in. by 42 in. stroke, with two large boilers with a pressure of 165 lbs. After a series of runs over the measured mile, a mean speed of over 11 knots was obtained, everything working most satisfactorily. During construction both hull and machinery have been personally superintended by Mr. Wm. Law, of Liverpool. Amongst those present at the lunch were Mr. J. E. Thompson, representing the builders; Mr. Michalinos and Mr. Law, representing the owners; and Mr. Bowden, the engine builders.

**Leatris.**—On August 12th the new steamer *Leatris* went for a trial trip off the coast, when a mean speed of 12 knots was obtained, the engines working without hitch, and giving satisfaction to all concerned. The *Leatris* is a steel screw steamer, 255 ft. in length by 38½ ft. beam, and has been constructed by Messrs. Richardson & Co., Newcastle-on-Tyne, for the Cork Steamship Co., of Cork, for their Continental service. The owners were represented at the trial by Mr. F. C. Kelson and Captain Hore, under whose joint superintendence the steamer has been built.

**Lennox.**—On August 13th the new steel screw steamer *Lennox* went down the Clyde on her steam trials. The *Lennox*, which is about 3,700 tons gross, with a deadweight carrying capacity of about 5,600 tons, was built by Messrs. Barclay, Curle & Co., of Whiteinch, to the order of Messrs. John Warwick & Co., Leith, to trade between the United Kingdom, China, Japan, and the United States. The dimensions of the vessel are:—Length, 353 ft.; breadth, 44 ft.; and depth, 28 ft. 6 in. On the two progressive runs she attained a speed of over 12 knots an hour, which was considered satisfactory.

**Chesapeake.**—On August 15th and 17th the s.s. *Chesapeake*, built for the Anglo-American Oil Co., Limited, of London, by Messrs. David J. Dunlop & Co., Inch Works, Port-Glasgow, which a full description was reported at the time of the launch



ran her various trials, when the most satisfactory results were obtained. The progressive and full speed trials were made on August 15th, when a mean speed of a little under 12½ knots was attained. On the official six hours' run on August 17th 12 knots, or ½ of a knot more than was stipulated for, was kept up, the machinery working with perfect smoothness, and to the entire satisfaction of the owners' representatives, the total displacement of the *Chesapeake* on both days being 9,000 tons, and it is perhaps worthy of remark that although displacing about 1,000 tons more than the previous two steamers built by Messrs. Dunlop for the Anglo-American Oil Co., the speed was about the same as in these vessels, while the maximum H.P. developed was almost identically alike. The *Chesapeake* is the first steamer belonging to the Anglo-American Oil Co. that has had her engines placed in midships, and the steadiness and total absence of vibration, when compared with vessels having their machinery aft, was remarked by everyone on board, and even when the severe test of reversing engines from full speed ahead to full speed astern was made there was an almost total absence of any movement at the after part of the poop deck, and it is fully expected that this departure will be one of great benefit in reducing the strain consequent on having machinery placed aft while the vessel is being driven into heavy head seas. Another feature, and one although perhaps of less importance, in having the engines amidships is that the builders had a freer hand in designing the vessel, and were able to turn out a very handsome model of steamer. On the official trials the builders were favoured by the presence of Mr. McDonald and Mr. Usmar, directors of the Anglo-American Oil Co., Limited, London; Mr. Blair, superintendent engineer of the company; Mrs. McDonald, Mrs. Usmar, Mr. and Mrs. Piesse, Mrs. J. D. Jamieson, and a party of friends invited by the owners and builders. The day being all that could be desired, a very happy and most successful trip terminated on the return of the steamer to Gourrock about 5 p.m. After taking in stores and coals the *Chesapeake* sailed for New York on Thursday, August 22nd.

**Sardinia.**—On August 20th the steel screw steamer *Sardinia*, which was launched at Dundee several weeks ago by Messrs. Gourlay, for Messrs. James Currie & Co., of Leith, was taken for her trial trip. The *Sardinia*, a description of which has already been published, ran a series of progressive trials over the measured mile, a high rate of speed being attained.

**Samoyed.**—On August 20th the new armed steam transport *Samoyed*, which has been built and engined by the Thames Ironworks and Shipbuilding Co., of Blackwall, for the Russian Government, underwent her official speed trials at the mouth of the Thames. This vessel, although designated a transport, has been more especially built and fitted for the purposes of the Russian Imperial hydrographical service, and has the following principal dimensions:—Length, between perpendiculars, 170 ft.; breadth, extreme, 33 ft.; depth, from top of keel to underside of deck, 16 ft. 7 in.; her loaded water draught being 12 ft., at which her displacement will be 1,055 tons. After a preliminary trial on Monday to see that everything was in order, the *Samoyed*, having at the time a mean draught of 11 ft., left Gravesend on Tuesday, an hour before noon, and proceeded down the river to the trial ground at the Maplins, when a series of consecutive runs were made on the measured mile, with and against the tide, it being about at the flood at their commencement, the mean speed attained on the first nine runs being a good 12½ knots. The contract was for a realised speed of 11½ knots. The propelling engines of the *Samoyed*, constructed by her builders, are of the three-cylinder triple-expansion type, driving a three-bladed screw-propeller, the steam for them being supplied by two single-ended cylindrical three-furnaced boilers, made for a working pressure of 160 lbs. per square inch, which was maintained throughout the whole of Tuesday's trials, during which the I.H.P. developed by the engines was 1,495, the vacuum being 28 in.

**Eva and Hilda.**—On August 20th two screw tugs, named the *Eva* and *Hilda*, built by Messrs. J. T. Eltringham & Co., Stone Quay, South Shields, left the Tyne for the Manchester Ship Canal. The dimensions of the vessels are 55 ft. by 12 ft. and 7 ft. by 9 ft. The engines have been constructed by Mr. G. T. Grey, of South Shields. Very large steel boilers, made by the builders of the vessels, have been placed in each tug, to work at a pressure of 100 lbs. On Saturday afternoon the vessels were taken upon a preliminary trial, when the satisfactory speed of 10 knots an hour was attained. They proceeded via the

Forth and Clyde Canal to their destination. The owners are the Manchester Ship Canal Co.

**Minila.**—On August 20th the s.s. *Minila*, the third of a new line of steamers to be run by Messrs. Pinnillos, Izquierdo & Co., Cadiz, to give a monthly service between Glasgow, Liverpool, the principal Spanish ports and the Philippine Islands, went on her trial trip. She has been constructed by Messrs. Charles Connell & Co., Whiteinch, to pass Lloyd's highest class, and is of the following dimensions:—Length, 390 ft.; breadth, 46 ft.; depth, 31½ ft.; load displacement, 8,700 tons. Her machinery, consisting of a set of triple-expansion engines having cylinders 30 in., 48 in., and 78 in. by 64 in. stroke, two double-ended boilers and one large single-ended boiler, with donkey boiler, eight steam winches, Weir's feed pumps, heater and evaporator, and all the latest improvements; has been constructed by Messrs. Dunsinuir & Jackson, Govan. The vessel throughout is fitted up in a first-class manner, with electric light, and all the best appliances for the efficient handling of cargo. As in the case of the two preceding vessels, the hull and machinery have been constructed under the superintendence of Captain Abriaquita and Mr. Arriaga. The trial proved thoroughly satisfactory in every respect, the speed attained being 14½ knots, partly loaded. After the trial trip the vessel proceeded to Liverpool.

**Sumatra.**—The s.s. *Sumatra*, built by Messrs. Alex. Stephen & Sons, Linthouse, for the P. & O. Co., made her official trip in the Firth, on Tuesday, August 20th, with highly satisfactory results. The weather was fine, and the party on board enjoyed the trip exceedingly. The speakers after dinner were cordial and enthusiastic in their appreciative references to the noble ship, and her excellent performances on trial. The hull of the vessel was pretty fully described at the time of the launch, and now that the machinery has been completed and tested, some details regarding it may be of interest. The propelling machinery consists of one set of triple-expansion engines of massive design, having cylinders 28 in., 46 in., and 77 in. diameter by 64 in. stroke, supplied with steam from two double-ended boilers, 13 ft. 8 in. diameter, by 18 ft. 6 in. long, having 154 square feet of grate surface, 6,720 square feet of heating surface, fitted with Howden's system of forced draught, and working at 160 lbs. pressure. The engines are fitted with all the appliances that skill could devise, for the purpose of saving fuel and minimising risk of breakdown, and in design they are particularly substantial, and amply fulfil the traditional requirements of the company as to quality of material and excellence of workmanship. The surface condenser contains 4,385 square feet of tube surface, and is built in Messrs. Stephen & Son's usual manner, being cylindrical, of wrought steel plates, rivetted together with cast-iron ends, forming not only a design pre-eminently efficient as a condenser, but being also practically unbreakable. The air pump is fitted to the L.P. engine, and is large enough to enable the condenser to be worked as a common jet condenser in case of emergency. On either side of the air pump, and worked off the same crosshead, are two pairs of pumps, the after pair being fitted as bilge pumps, one of the forward ones as a sanitary pump, and the other for supply to hot bath on deck. The sea water is circulated through the condenser by one of Drysdale & Co.'s improved centrifugal pumps, having a diameter of 12½ in., and in case of a breakdown of this pump, the powerful ballast pump of Messrs. Stephen's make, can be made to circulate through the condenser. The crank shaft of the main engine is of Vicker's steel, and is of large diameter, running upon bearings of Parson's white brass. All the bearing surfaces of the machinery are particularly ample. The pistons are all fitted with Ramsbottom rings of a peculiar arrangement, and the piston valve, which admits steam to the high pressure cylinder, is fitted with MacLaine's patent rings. The reversing gear is of Messrs. Stephen & Son's own design, which automatically prevents the possibility of damage to the gear by throwing over the link too far. The reversal is very quickly performed, full ahead to full astern occupying but ten seconds. A Morison's patent evaporator, of 20 tons per day capacity, is fitted, as well as Morison's patent heater. The boilers are supplied with water by two of Weir's patent automatically controlled feed pumps, and for general service work in the engine-room there is a duplex pump of Messrs. Weir's make. A powerful ballast pump, of Messrs. Stephen & Son's design, is fitted, which is capable of pumping out the entire water ballast—nearly 800 tons—in five hours. The tunnel arrangements are very complete. The massive thrust block

large rubbing surface—1,750 square inches—is fitted with water circulation through each saddle in addition to the ordinary service pipes, and the tunnel bearings are all fitted with an elaborate lubricating and cooling arrangement. The propeller is four-bladed, having a cast-iron boss and manganese bronze blades, with zinc slabs fitted to the forward side of the rudder post, to prevent injurious galvanic action. A large steam turning engine is fitted at the after end of the engine-room. To prevent "racing" in rough weather the engines are fitted with the most improved form of Durham, Churchill & Co.'s patent governor. The high pressure and intermediate piston rods, as well as the high pressure valve spindle glands, are fitted with a metallic packing of a design patented by Mr. Mannel, the superintending engineer of the P. & O. Co. A steam hoist is provided for the discharge of ashes from the stokeholds. There is a fresh water distilling apparatus by Caird & Rayner, capable of supplying 2,000 gallons per 24 hours. For the rapid working of cargo there are four cranes and four winches of Messrs. Caldwell & Co.'s make. The donkey boiler is large, and like the main boilers it has Morison's patent suspension furnaces, and works at 160 lbs. pressure. There are two independent sets of generators for electric light by Siemens Bros., each set being sufficient to light the whole vessel. The ventilating arrangements have been very carefully considered and are very efficient, both the stokehold and the engine-room being remarkably cool. The machinery is capable of developing 2,500 H.P. in ordinary working and will drive the vessel at a high speed at sea. The whole work has been carried out under the supervision of G. W. Mannel, Esq., R.N.R., the superintending engineer of the company, assisted by Mr. H. J. Taylor, Greenock, and Mr. J. Pettigrew, Greenock, and by Mr. Fred J. White, R.N.R., the chief engineer of the steamer, as resident engineer.

**Lady Furness.**—Lately the s.s. *Lady Furness*, built by Messrs. Furness, Withy & Co., Limited, West Hartlepool, went out on her trial trip in Hartlepool Bay, and had a very successful run. A speed of a little over 12 knots was attained. The vessel is a substantial type of a modern cargo boat, measuring well on to 340 ft. in length, with a large measurement and deadweight capacity, and is built throughout of Siemens-Martin steel to the highest class at Lloyd's, and every care has been taken in designing the vessel to construct her as strong as possible for the heavy deadweight trade. The vessel is built on the web-frame system, with cellular double bottom all fore and aft, and subdivided at intervals, the after peak being also available as a tank. The main and fore holds are divided by steel watertight bulkheads, efficiently stiffened by an iron longitudinal division. The greater portion of the shell plating is in 24 ft. lengths, and is efficiently backed up by strong sectional framing to the top of the vessel all fore-and-aft, the top side plating being extra thick to withstand the heavy Atlantic trade. The bottom plating is also thicker in way of the ballast tanks to allow of the vessel lying aground whilst loading. The whole of the weather decks, tank tops, floor plates, &c., are also of extra thickness, and the hatchways are of a size to take in the bulkiest cargo. Large steam winches, patent steam steering gear amidships, hand steering gear aft, steam windlass, large donkey boiler, and patent stockless anchors are fitted. The vessel is rigged as a pole-masted schooner, and to make her available for bridge and canal work the top masts are fitted to telescope into the lower masts. The engines and boilers are fitted by Messrs. Thomas Richardson & Sons, Limited, Hartlepool, who were represented on board the vessel by Mr. Robinson. The machinery worked very smoothly throughout the trial. The vessel has been constructed under the careful supervision of Captain Tregarther on behalf of the owner, Mr. George Syd. Coram, of London, who accompanied the ship on her trial trip, and who seemed highly pleased with the ship in every way. The builders were represented by Mr. R. W. Vick and Mr. G. W. Sivewright.

**Wales.**—The new steamer *Wales*, of the Hull Steam Fishing and Ice Co., Limited, has lately made her official trial. The *Wales* has been built by Messrs. Cochrane & Cooper, at their Grovehill Shipyard, Beverley. She measures 98 ft. long by 20 ft. 6 in. in breadth, by 11 ft. depth of hold. The machinery, by Messrs. Amos & Smith, comprises triple-expansion engines, having cylinders 10 in., 16 in., and 26½ in. diameter, by 20 in. stroke, steam being obtained from a large steel boiler of the multi-tubular cylindrical type, working at a pressure of 170 lbs. per

square inch, and tested to 340 lbs. by hydraulic pressure. Both ship and machinery have been built under Lloyd's survey, and under the personal supervision of Mr. Beath, the owning company's superintending engineer. Notwithstanding the weather, which was anything but favourable, the *Wales* proved herself a fast ship, and the owners' representatives, Messrs. Henry Maddick and John Hobbs (directors), and Mr. Beath, engineer, expressed themselves highly satisfied with their new ship. Mr. Cochrane represented the builders, and Mr. Amos the engineers. The *Wales* is the first of five vessels on order from the same contractors for the Red Cross Co.

**Falcon.**—The *Falcon*, the latest addition to the Grimsby fleet of trawlers, has lately been on her trial trip. This vessel has been built to the order of Mr. T. Baascomb by Messrs. Cochrane & Cooper, of Beverley, and the engines have been fitted into her by Messrs. C. D. Holmes & Co., of Hull. She is fitted with the new patent trawl gear and other latest improvements, and the engines, which have been built under the superintendence of Mr. J. B. Sturdy, are supplied with an evaporator and feed heater. The *Falcon* went down the river, and, after taking on board the owner and a number of friends, proceeded out to sea to test the machinery and speed of the vessel. She proved herself all that could be desired as a sea boat, and the speed test showed her to be an 11 knot vessel. Messrs. A. Cochrane and J. R. Smith represented the shipbuilders and engineers respectively.

**Steel Screw Tug.**—A steel screw tug, built by Messrs. Jos. T. Eltringham & Co., of South Shields, to the order of the Manchester Ship Canal Co. (Bridgewater undertaking) for towage and other service, was recently taken on her trial trip. The dimensions of the vessel are as follows:—90 ft. by 19 ft. by 10 ft., with twin compound surface-condensing engines having cylinders 14 ins. and 30 ins. by 21 in. stroke, built by Mr. George T. Grey, South Shields, and having a large steel multitubular boiler, by Messrs. Eltringham, working at 120 lbs. pressure. In addition to the ordinary tug arrangements, a large saloon has been fitted at the fore part of the vessel for the use of the directors and officials of the Canal Company. On the trial, the machinery attained a mean speed of 10½ knots, and both vessel and machinery gave the greatest satisfaction to the builders, and the representative of the Manchester Ship Canal Co., Mr. Rawlinson, who has superintended the construction of the hull and machinery. At the conclusion of the trial the vessel left South Shields for Liverpool, via the Caledonian Canal.

**Duke of Lancaster.**—The twin-screw steamer *Duke of Lancaster*, built by the Naval Construction and Armaments Co. for the Fleetwood and Belfast naval service, has proved herself the fastest vessel of that fleet. On her preliminary trials she steamed 17 knots with natural draught, and with forced draught 19 knots per hour. Since then, on her trials on service, she steamed 19½ knots on forced draught against a gale of wind, and 17½ knots natural draught. She has made the record passage between Fleetwood and Belfast in 5 hours 45 minutes, and has thus beaten her sister ships the *Duke of Clarence*, built at Laird's, and the *Duke of York*, built at Denny's. The Fleetwood and Belfast route now boasts of the finest fleet of steamers engaged in the Channel service.

**Ivy.**—The twin-screw yacht *Ivy*, recently launched by Earle's Co., at Hull, has lately been for her official trial trip. She has been built for the service of H.B.M. Niger Coast Protectorate, on the West Coast of Africa, and is a composite vessel of the following dimensions:—Length over all, 237 ft., and 204 ft. between perpendiculars, breadth, 34 ft.; and depth, 16 ft. 6 in. Her framing and beams, &c., are of steel, and the planking of teak, sheathed on the bottom with copper. The machinery consists of two sets of triple-compound engines of 130 N.H.P., having cylinders 13½ in., 22½ in. and 35 in., by 27 in. stroke, driving bronze propellers. The average speed was found to be 18½ knots, or 1½ knots over the guaranteed speed.

**Institute of Marine Engineers.**—The fifth annual dinner in connection with the institute will take place at the "London Tavern," Fenchurch Street, on Friday, the 13th September, at 6 for 6.30 p.m., at which the president for the year, A. J. Durston, Esq. C.B., R.N., will occupy the chair.

## Reviews.

*A Manual of Marine Engineering.* By A. E. Seaton. London: Charles Griffin & Co. 1895.

THIS standard work on marine engineering needs no introduction to our readers, and if it did the appearance of the twelfth edition would hardly be the occasion on which to give it. Yet we cannot pass by the event altogether. For though the work is our old guide, philosopher and friend, we find that its bulk has increased with age, and that it has kept itself fully abreast of the times. The science of marine engineering moves swiftly, and there is a rapid improvement in practice and a swift accumulation of experience and of information. Thus it has become necessary, as the editions came out in rapid succession, to keep on enlarging the chapters, and continue the posting of the material up to date. The present volume contains in its preface a very interesting comparison of the progress which the last fifteen years has shown. The now universal triple-expansion type of engine was, as the writer puts it, then but a dream. Even the compound type had not yet come into universal use. Boiler pressures were just half what they are to-day. The torpedo-boat, which was then just coming into use, was regarded as a toy, though its development has led to so much both in warship and passenger steamer practice. Heavy forgings of steel were the exception, not the rule, and the three-crank engine was equally rare. At the root of all this progress, in the opinion of a writer so well qualified to express an opinion as is Mr. Seaton, lies the fact that it has become possible to produce mild steel at the price of ordinary iron. It may further be added that it is not only the actual cheapness of the material which has wrought such a revolution, but it is the actual improvement in the material itself as well. Fifteen years ago it would scarcely have been possible, at any price within commercial limits, to have got such material as is now in universal use at all. It would certainly not have been possible to have got it in large quantities.

The advance has, however, taken place, and the book before us has been altered and adapted to the changed conditions it has to meet. Much of the historical part of the work has been cut away and space thus found for some of the new matter. Most interesting, perhaps, at the present time is the new chapter on water-tube boilers, where the early gropings after the idea now developed are traced and recorded. He begins by noticing the boiler of Colonel Stevens, made as long ago as 1805, on the other side of the Atlantic; and that of Goldsworthy Gurney, of date 1827, which is illustrated at page 890, and in its general aspect foreshadows the successful Thornycroft boiler of to-day. A very large number of modern patents are discussed and depicted, and the whole number are divided into two general classes, those which have and those which have not "drowned tubes." The respective merits of the two classes are also noticed. The question of feed water supply has the attention which it deserves in boilers where a proper supply is of such vital necessity.

In the appendix we find the rules of the various corporations and public departments as to the strength of the materials and the construction of boiler-shells, etc., and amongst them it is noticeable that the regulations of the British Corporation are now included.

Attention is given to the large number of auxiliary engines and appliances which nowadays assume such importance on shipboard, and tend so largely to the economy and life of the machinery. The specialities of many well-known firms of engineers are noticed and explained.

The formulae and tables are most full and modern in their range, and the book undoubtedly fulfils the intention of the writer, for it certainly shows the application of theoretical principles to the design and construction of marine engines and is a monument, not only of the best practice of the day, but of the patience, energy and skill of that most successful writer and teacher whose name appears upon the title-page.

*Stress Diagrams in Open or Lattice Girder Work.* By W. H. Bidder. London: Gale & Polden. 1895.

THE author of this little volume is sufficiently well known from his eminence in his profession and from the magnitude of the works which the world owes to his industry, for anything from his pen to command attention. The present volume will probably command the greater attention from the fact that the author has been driven to publish it owing to the mistakes which

he observes in other works which treat of the particular subjects with which he here deals. He tells us of two instances of a very glaring kind. He refers to them in his preface. The first was a diagram, where the effect of gravity was shown as horizontal instead of vertical, and of another where a train passing over a bridge was represented as taking with it not only its own load and itself, but also the girders, rails and platform over which it had passed. It is perhaps unfortunate for the "gaiety of nations" that this last representation was diagrammatic only and not pictorial. In the latter case it might have served as an inspiration to the illustrator of Baron Munchausen's works.

The volume contains some twenty diagrams with explanation. We find Mr. Bidder giving instances of structures in which the various forms with which he deals have been employed. He gives his reasons for considering certain examples to be wrong, and is careful to give credit to those who have apprehended the fallacy. Thus he gives one sheet to illustrate his theories about rivetted joints. Here he contends that the old and ill-fated Tay Bridge contained millions of useless rivets, whose cost, if properly expended, might have been usefully employed in giving the structure such extra strength as would have enabled it to have withstood the great gale which proved fatal to it. The book bears the marks of having been written by one who is absolutely familiar with the practical working of his profession, and who is accustomed to say exactly what he thinks without fear and without favour. It is clearly expressed and cannot fail to be of great use to those for whom it is intended.

*Nuovo Caratteri della Nave Moderna Memoria.* By S. Raineri. Naples. 1890.

THIS is a paper read nearly a year ago before the Reale Istituto d'Incoraggiamento at Naples. It is a review of the progress of the development of steam as seen in the improvements of marine engineering and shipbuilding. The author commences his review with the *Comet*, built on the Clyde by Henry Bell in 1812, and thereafter he is careful to give full credit to British inventors and constructors. He notices the various improvements in the special design of ships for special trades. In this connection he refers to Sir E. J. Reed's designs for vessels for the carriage of petroleum in bulk, to the turret steamers of Messrs. W. Doxford & Co., of Sunderland, and to the huge and economical cargo boats which Messrs. Harland & Wolff have turned out for the White Star cargo service. Big as these are they are not quite as large as the *Cevic* is made out, by an obvious misprint, to be. The application of petroleum as fuel for steam-raising purposes is noticed, and in this connection credit is given to our Great Eastern Railway for its experiment—now well passed the experimental stage—of burning oil in locomotive engines. The improvements obtained by the duplication and triplication of screw propellers is noticed too, and the performances of our torpedo destroyers and of the Cunard *Campania* instanced as the measures of high water mark of our present practice. Signor Raineri speaks of the compound engine of John Elder & Co., of Dr. Kirk's triple-expansion engine, of the feed-heater, the evaporator, and the automatic lubricator, as having contributed to the present advance. But credit is also given to improved quality of material, and to improved forms of material, whereby weight is gained and power saved. He discusses the prospects of aluminium as a material for shipbuilding, and concludes that at present the corrosive effect which sea water has upon it is an insuperable obstacle to its general employment. The paper throughout bears the marks of having been written up by one who has a thorough mastery of the history and literature of his subject, and the constant references to English practice and English books are a proof of the friendly feeling with which our countrymen are regarded by the Italians.

*Drawing and Rough Sketching for Marine Engineers.* By James Donaldson. London and Liverpool. 1895.

THE usefulness of Mr. Donaldson's work is attested by the fact that it has been necessary to bring out a sixth edition. The present opportunity has been taken to bring the book thoroughly up to date, not only by revision, but by considerable additions. These are necessitated by the constant improvements in the marine engine and by the much higher boiler pressures now in common use. The volume before us is divided into two parts, to the former of which the name used for the whole more properly belongs. Mr. Donaldson commences with the necessity for acquiring practical knowledge of the engine. Naturally

he is able to put his case very forcibly, for we suppose nobody would deny that some capability of expressing his ideas graphically is vital to the man whose occupation is bound up with the science of mechanics. Then, very briefly and concisely, he explains what instruments are required by the beginner, and hints are given as to the proper use of them. Then follows letterpress explanatory of the thirty-four pages of plates which the learner is given to study and copy. The explanation of the drawings leads to the consideration of the proper strength and proportion of the various parts of the modern marine steam engine, and the beginner who has worked intelligently and conscientiously through the plates, with proper attention to the letterpress, will have absorbed a very great deal of practical knowledge of the design, construction and use of the most modern types of marine engines and their various accessories. Amongst other information are given copies of the specifications for sets of boilers and for triple-expansion engines.

In addition are given a considerable number of useful tables, containing the weights of sheets of iron and copper, dimensions and proportions of nuts and bolts, whilst an appendix contains Lloyd's and the Board of Trade rules, with which it is desirable for the practical engineer to be fully acquainted.

The second part is designed as a guide to the Board of Trade examinations for marine engineers. Preceded by clear general instructions, the author gives usual subjects for "examination in rough working drawing," and with each gives the answer which the candidate should put in in conjunction with his drawing, as instructed. This part of the book is supplemented by explanations of some of the principal accessories to the marine engine, such as Weir's evaporator, and drawings of details of various kinds, including the method of temporarily repairing broken shafts at sea.

Taken as a whole, the book will be found most useful to the young beginner. He will be able, if he have sufficient perseverance, to go completely through the volume, to instruct himself and to obtain his certificates without the aid of a tutor. His knowledge, too, will be of a thorough and intelligent kind, not a mere smattering acquired merely for the purpose of getting through the necessary examinations.

*The Mechanical Engineer's Reference Book for Machine and Boiler Construction.* By Nelson Foley, M.I.N.A., M.I.M.E., etc. London: Crosby Lockwood & Son, 1895.

It is not far short of four years since we noticed the first edition of this invaluable work of reference. We have now to briefly record the fact that in spite of the somewhat high cost of the volume, necessitated by the elaborate and well-finished plates which it contains, the demand has already exhausted the supply, and the first edition being out of print the author has taken opportunity to revise and extend the information contained.

Thus, for example, we see under the head of *elasticity* that notes and formulae are added as to the effect of elasticity on the strength of materials and upon resiliency, as well as upon the radius of curvature and elastic rings. The valuable information respecting boiler construction has been extended and brought down to date, and in this connection we may notice the additional tables as to evaporation and coal consumption. The table of circumferences, areas, squares and cubes of circles which previously ran up to a hundred has been extended to include every unit up to a thousand. A table of comparison of British Imperial measures of weight and those of the decimal system is new and will prove useful, and many other additions and extensions are included.

In our original notice we commented upon the fact that the work would become indispensable to all mechanical engineers. That prophecy seems to be in the way of being realised. The lucidity of expression and clearness in explanation of the book are equalled by the care and discretion with which choice has been made of the matter provided. The whole book bears the impress of having been compiled by one who, having been actively engaged in mechanical pursuits himself, is able to appreciate and cater for the wants of others similarly situated.

**New Triple-expansion Engines.**—Messrs. S. & H. Morton & Co., shipbuilders, &c., of Leith, have received the contract to overhaul and fit the London and Edinburgh Shipping Co.'s steamer *Isac* with new triple-expansion engines.

## Miscellaneous.

**Belleville Boilers for the Austrian Navy.**—The Austrian Government have decided to try the Belleville water-tube boiler, and they have sent an order to Messrs. Maudslayi, Sons & Field, London, for the construction of a set of steam generators of that type for the battleship *Buda-Pesth*, now building at Trieste. She is to develop 8,500 I.H.P. under natural draught, and the boilers will have a collective grate area of 720 square feet, and a heating surface of 22,500 square feet. The engines are also to be built at Trieste, and this arrangement will ensure greater fairness in the competitive trials to be made. There are three battleships of the same type, with precisely the same machinery, being constructed at Trieste. Two will have multitubular boilers, the *Buda-Pesth* alone differing in having Belleville boilers. The relative merits of the two systems will be thoroughly worked out at the trials.

**New Contracts.**—Messrs. Wm. Simons & Co., Renfrew, have received an order from the Crown Agents for the Colonies to construct a large and powerful hopper dredger for Colombo, Ceylon, also a tug steamer for the same port.

**The New American Screw Steamboat "Newport News."**—This vessel has lately been completed by the Newport News Shipbuilding Co., of Newport News, Virginia, U.S.A., for the Norfolk and Washington Steamboat Co., to run on the route between Newport News and Washington, D.C. She is a handsome steel steamboat, and in appearance and general arrangement closely resembles the *Richard Reck* and *Maine*, of the Sound Lines. Her principal dimensions are:—Length over all, 275 ft. 6 in.; length, water line, 260 ft.; extreme beam over guards, 46 ft.; beam on water line, 37 ft.; depth of hold, 16 ft. 6 in. There are four complete decks, named respectively lower, main, saloon, and hurricane. The lower deck is devoted to the crew and second-class passenger accommodation. The main deck is used exclusively for freight with the exception of the ladies' cabin aft, whilst the saloon deck is devoted entirely to first-class passenger accommodation. On the hurricane deck is the pilot-house and officers' state-rooms forward, with the dining-room just abaft these rooms. The motive power consists of a vertical triple-expansion engine of 2,800 I.H.P., with cylinders 24 in., 37 in. and 62 in. diameter respectively, with a stroke of 36 in. There are two double-ended boilers 21 ft. long and 13 ft. diameter each, with 4,250 square feet of heating, and 140 square feet of grate surface. The working pressure is 160 lbs. The propeller is of manganese bronze, 12 ft. 6 in. diameter and 17 ft. 6 in. pitch. On her official acceptance trial, the vessel steamed over a 20-mile course in dead water, at an average speed of 21.2 statute miles per hour, or 18.4 knots, which is fully one knot over the stipulated contract speed. The vessel was commissioned August 1st, and has already proved herself a speedy, seaworthy, and popular vessel.

**Lagging for Boilers and Refrigerating Plant.**—Professor Andrew Jamieson, of Glasgow, has contributed to the Institution of Civil Engineers a paper in which he describes the results of investigations undertaken at Glasgow for the purpose of determining the relative and absolute thermal conductiveness of substances used as lagging for steam boilers, for parts of steam engines, and for refrigerating machines. The method adopted was to observe the fall of temperature in a known weight of hot water contained in a vessel coated on all sides with a certain thickness of the material under examination, the outer surface of which was maintained at a constant temperature by a continuous flow of cold water through a water jacket. Seven compositions were tested—first, a composition of fossil meal, roasted and mixed in Glasgow, consisting of 60 per cent. of washed white German kieselguhr and 40 per cent. of binding material. It is applied in a wet state to steam pipes or boilers, steam being kept up to dry the material quickly. It adheres well to the surfaces, making a neat covering. Professor Jamieson also showed that the temperature in two hours fell 21.5 degrees centigrade, the conductivity as compared with dry still air being 4.82. The next was silicate cotton or slag wool, produced by blowing steam into melted blast furnace slag, and the fall in temperature in two hours was 29 degrees centigrade, the conductivity as compared with dry still air being  $\times 6.95$ . The third was a composition of kieselguhr from mines in Germany, with 10 per cent. of binding material—viz., fibre and mucilaginous extract of several vegetable matters. The fall in temperature was 29 degrees, and the conductivity 7.77. The fourth

composition was a cement consisting of fine blue clay mixed with flax, jute, and woollen waste or cowhair, in equal proportion, surrounded by a layer of hair, felt and canvas. The fall in temperature was 30, and the conductivity 6.47. The next was a fibrous composition of fine blue clay from the Glasgow district, mixed with flax, hemp rope, jute, cowhair, and woollen waste. The fall in the temperature was 34.5 and the conductivity 7.98. Two papier-mache compositions were tested, consisting of paper pulp mixed with clay and carbon with hair and fragments of hemp rope. The fall in temperature was 35.5 and 37.5, the conductivity 7.93 and 8.99. The latter, therefore, showed the greatest fall in temperature, Glasgow clay and hair, &c., being next.

"St. Louis."—On Tuesday, August 20th, the American liner, *St. Louis* was taken out for trial under the superintendence of Captain Bradford, U.S.N., assisted by Lieutenant Mulligan, U.S.N., returning to Southampton in the evening. She was run a distance of 104 knots, 52 knots with the tide, and 52 knots against. Her speed on the 52 knots with the tide was 23.6 knots; on the 52 knots against the tide her speed was 21 knots, giving a mean speed of 22.3 knots. This was 2.8 knots more than was required to fulfil the contract with the United States Government, and the naval officers conducting the trial expressed themselves as exceedingly gratified with the results. Everything worked perfectly.

**A Great Lake Steamer.**—The largest vessel on the American lakes is about to be commenced by the Cleveland Shipbuilding Co. of Cleveland, Ohio. She will be a steel steamer exceeding in length by more than 10 ft. the *Victory*, just launched at Chicago. A novelty in the construction of this great steamer will be the absence of a wooden deck; instead of such a deck, the tank top will be made extra heavy and ore will be dumped directly down upon it. The dimensions of the new steamer will be as follows:—395 ft. keel, 415 ft. over all, 45 ft. beam, and 28 ft. deep. She will have twelve hatches and 24 ft. centres. The steamer will be propelled by a triple-expansion engine with 23 in., 38 in., and 63 in. cylinders of 40 in. stroke. She will have two Scotch boilers 14 ft. in diameter, and 18 ft. long.

**Sand Pumping Dredger.**—Last month Messrs. William Simons & Co., Limited, Renfrew, launched and despatched to La Guaira, Venezuela, a sand pumping dredging vessel for the improvement of that new port.

**Mr. Thomas Beynon**, of No. 9, Dean Street, has been appointed agent in the Newcastle district, for Caddy & Co.'s (Nottingham) tubular chilled face fire-bars, and other specialities.

**Mr. James Dunn**, Chief Constructor at the Admiralty, has been appointed Acting Director of Naval Construction, in the absence through illness of Sir William H. White.

**Torpedo Boat.**—The launching at Havre of the sea-going torpedo boat *Forban*, now in course of construction, will, says the *Petite République*, be quite an event in the maritime world. The journal adds that by the terms of the contract the vessel, which is being built according to a novel design, will be capable of steaming 30 knots an hour, a speed not hitherto attained in any navy in the world.

**Largest Sailing Vessel.**—The five-masted sailing ship *Potosi*, recently launched at the Tecklenborg Yard, Bremen, for the Hamburg firm of F. Laeisz & Co., is said to be the largest sailing vessel afloat. The *Potosi*, which is built of Siemens-Martin steel, is 394 ft. in length, over all; 49 ft. 9 in. wide over the plating amidships, and 31 ft. 2½ in. deep from the upper edge of the keel to under the main deck amidships. Her registered burden is 3,955 gross tons, and her displacement, on an average draught of 25 ft., is 8,580 tons, with a carrying capacity of 6,150 tons. The masts and larger yards are of steel. The height of the mainmast, from keel to truck, is 210 ft., and its diameter at the deck is 34 in. All the standing tackle is of galvanised steel wire, and the running gear is partly of wire and partly of hemp. The spread of canvas, with all sails set, will be equal to about 5,000 square yards. Special stiffening and strengthening arrangements have been adopted, in view of the heavy masts and the enormous pressure on the sails.

**A Trades and Industrial Exhibition** under the management of Mr. H. Engel, is to be held in the Town Hall, Middlesbrough, towards the end of the year. Mr. Engel, whose present address is Mason Chambers, Mosley Street, Newcastle, is the gentleman who managed the different trades exhibitions held in Newcastle, Sunderland and South Shields during the last couple of years, all of which were most successful.

## Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from July 10th to August 7th, 1895.

- 12703 R. Stephenson and F. Chorlton. Slide valves.
- 12740 J. Batty. Grab or bucket for dredging sand.
- 12754 P. Bentzen and C. F. Olsen. Tubulous boilers.
- 12755 P. Bentzen and C. F. Olsen. Tubulous boilers.
- 12790 F. Oberstenfeld. Tiller bearing for rudders.
- 12816 E. A. and H. Sandford. Adjustable bearings.
- 12824 J. W. Gibbs. Engines for ventilating fans.
- 12882 D. A. Casalonga. Rotary steam engines.
- 12909 J. W. Blackburn. Jacketing steam pipes.
- 12928 E. Larsen. Steam condensers.
- 12940 J. McNeill. Keel for boats.
- 12956 H. Ellis and B. G. Coleby. Torpedo boats.
- 12965 H. H. Lake (F. de Luca, Italy). Slide valves for engines.
- 12981 J. Southall. Oil motor engines.
- 12995 R. E. Maile. Position finder for ships.
- 12996 J. Delvin. Trawl gear.
- 13007 G. Barker (C. P. Budd, United States). Screw Propellers.
- 13017 E. J. G. Naldrett. Screw propellers.
- 13025 F. W. Kitto and W. Haworth. Cooling shaft bearings.
- 13029 J. Abbott. Safety valve.
- 13031 H. Schneider. Steam boilers.
- 13058 W. Harman. Heating boiler feed-water.
- 13087 R. Mackay. Range-finder for coasting ships.
- 13089 C. H. Mitchell. Folding berths for ships.
- 13105 W. H. Harfield. Engines for steering gear.
- 13127 R. Welford and P. Mitchinson. Ships' winches.
- 13133 T. Murphy and H. Fawns. Beamless trawl gear.
- 13197 G. F. Priestley and W. S. Bancroft. Regenerative furnaces.
- 13204 W. Galbraith. Compound armour plates.
- 13257 C. P. Beau. Apparatus for generating steam.
- 13260 K. A. Klose. Pipe wrenches.
- 13264 T. G. Tagg. Combined rudder and skeg for launches.
- 13265 O. Partridge and S. Cherry. Mariners' compasses.
- 13296 H. Drysdale, jun. Steam trap.
- 13316 A. Goodwin. Propelling navigable vessels.
- 13319 W. D. Pickels. Steam heating apparatus.
- 13342 T. W. F. Cherry. Automatic shut-off valves.
- 13350 S. Saunders. Return steam trap.
- 13361 W. Key. Steam boiler furnaces.
- 13371 W. G. Gregory and A. Pillatt. Furnace fire-bars.
- 13375 T. Walkmann. Furnace fire-bars.
- 13385 E. A. Stierlin. Raising of submerged vessels.
- 13391 G. Hesse. Furnaces of steam boilers.
- 13392 G. Klug. Lubricators.
- 13403 J. S., R. D., W. D., and H. C. Cundall. Engines.
- 13407 C. P. Johnson. Metallic packing.
- 13457 G. Rockiffe. Anti-fouling composition.
- 13462 A. Schnakenberg. Vertical steam boilers.
- 13485 S. Hulme. Steam boiler and other furnaces.
- 13486 K. Zimmermann. Removing incrustations from boilers.
- 13496 L. Obry. Discharging ship's guns.
- 13501 G. Pott. Centrifugal machines.
- 13512 A. Thiesing, T. Marotake, and F. Keller. Apparatus for utilising the ebb and flow of the tide.
- 13516 J. Hargreaves. Valve motions for steam engines.
- 13517 J. Thomson. Lubricating upright spindle bearings.
- 13563 O. Friederici. Boiler fires.
- 13578 E. Steller. Lubricators.
- 13586 S. J. Randall and P. A. Allen. Sheave blocks.
- 13592 T. D. and H. W. Swift. Screening coal.
- 13594 D. Smith. Rivetting seams of sheet metal.
- 13637 C. Herbert (F. Herbert, Australia). Direct acting engines.
- 13675 W. Lorenz. Inlet valves of petroleum motors.
- 13732 H. Kesterton and W. Allmann. Valves.
- 13736 J. O. Gilbert. Boilers.
- 13742 T. P. and G. H. Wiggins. Water gauges.
- 13746 O. Imray (E. and M. Mannesmann, Germany). Seamless metallic tubes.
- 13753 T. S. Fefel and C. R. Pae. Adjustable float.
- 13765 H. C. Ashlin. Steam generators.
- 13775 J. B. Torres. Manufa-



13789 J. Roohford. Propellers.  
 13808 T. Shore, jun. Steam traps.  
 13809 W. Deighton. Steam boiler flues.  
 13810 W. Deighton. Corrugated sectional tube.  
 13812 B. J. Maloney. Couplings for connecting shafts.  
 13824 J. Drysdale. Warships.  
 13828 C. W. Thompson. Slide valves for steam engines.  
 13850 W., H. E. and J. C. Lupton and W. Calvert. Valves.  
 13859 T. Clarkson. Steam generators.  
 13861 T. Clarkson. Valve mechanism.  
 13870 H. C. Ashlin. Steam boiler furnaces.  
 13880 J. Westray. Marine and other steam boilers.  
 13902 S. J. Howells. Valves.  
 13903 A. V. Coster. Mounting propeller blades.  
 13918 E. O. Atkinson. Sliding seats for rowing boats.  
 13945 J. O. Fell (J. Hammer, —). Rowlocks.  
 13950 J. B. Smith. Steam boilers.  
 13970 J. Baird. Launching, &c., ships' lifeboats.  
 13972 J. Whittaker. Steam boiler furnaces.  
 13974 W. B. Sage. Boiler furnaces.  
 13993 G. F. Thompson. Steam jet blowers.  
 14008 R. I. Brown. Metallic belting.  
 14022 S. W. Wilkinson and the Grove Company, Limited.  
 Preservative composition for coating iron.  
 14084 J. S. Stevens and C. G. Major. Hydraulic machinery.  
 14046 J. B. Morgan. Rotary steam joints.  
 14059 F. T. Marshall. Sectional water-tube boilers.  
 14063 G. C. Marks. (The Rubber Tire Wheel Company,  
 United States). Anti-friction bearings.  
 14067 H. Gray. Valve gear.  
 14068 D. Adorjan. Steam superheaters.  
 14076 F. Durand. Inlet valve of petroleum motors.  
 14101 G. Hughes and A. G. Birch. Steel yards.  
 14105 H. C. Merrill. Torpedoes.  
 14121 L. Spring. Fitting for working trawl-nets.  
 14180 H. Midgley and T. Smith. Steam boiler and furnaces  
 for burning smoke.  
 14182 G. Unger. Boiler furnaces.  
 14186 J. C. Peache. Steam engines.  
 14174 F. W. Golby. (B. Boulogne, Holland). Boat disengaging  
 gear.  
 14184 J. H. Ladd. Steam generators.  
 14186 R. Punshon. Mariner's compass.  
 14191 J. H. Latham. Signalling on board steamers.  
 14231 A. Hamilton and A. McMaster. Steam steering gears.  
 14237 J. Donaldson and W. O. A. Lowe. Furnaces and flues.  
 14310 W. Scott. Scraper for ships.  
 14324 S. Dure. Machinery for dry-docking ships.  
 14330 L. E. Vial. Propeller.  
 14335 E. Turner. Steam engines and pumps.  
 14344 J. S. D. Shanks and J. MacCormac. Furnaces.  
 14364 G. L. Albert. Propelling vessels.  
 14367 J. Drysdale. Ships' or boats' rudder, &c.  
 14373 F. E. Otto. Valve.  
 14385 F. Dürr. Engines.  
 14406 W. Laing. Rings for piston packing, &c.  
 14409 C. Hellyer. Trawl tow gear and clip.  
 14411 C. Ankers. Lubricators.  
 14465 E. Powell. Furnaces.  
 14468 W. L. Wise (R. S. Shedden, at present on the High  
 Seas). Boat plug.  
 14469 H. G. Keasbey. Feed-water heaters, &c.  
 14470 H. G. Keasbey. Feed-water heaters.  
 14499 J. Hartmann. Cleaning of steam generators, &c.  
 14552 W. Eaves. Steam generators.  
 14558 J. B. Laurent and T. Davies. Ships' ventilators.  
 14560 L. Spring. Working trawl nets.  
 14578 O. D. Holmes. Steam trawl winches, &c.  
 14595 C. E. Roberts. Slide valve for steam engine.  
 14620 W. Clark. Steamships and other vessels.  
 14629 T. Bowley (O. P. Payne, J. H. Southcoote, and J. Santer,  
 Australia). Collapsible bucket.  
 14637 J. B. Pitchford. Cut-off valve for engines.  
 14651 H. Hanks and F. S. D. Scott. Watertight door for  
 ships.  
 14690 G. H. Brown and T. Lancaster. Drop valve engines.  
 14701 G. Schwietzke. Water gauges.  
 14707 P. J. Bunau-Varilla. Dredgers.  
 14746 T. E. Mitton. Lubricators.  
 14749 J. D. de Benjumea. Steam boilers.

14823 S. E. Howell. Tubes for steam generators.  
 14832 S. A. Johnson. Preventing the flow of water in ships.  
 14833 T. Rowland. Boilers.  
 14884 C. G. P. de Laval. Boilers.

## BOARD OF TRADE EXAMINATIONS.

NOTE.—1C denotes First Class; 2C, Second Class.

July 27th, 1895.

Adams, Hy. J. . . . 2C N. Shields  
 Adie, Patrick J. 1C Liverpool  
 Asough, M. M. 1C N. Shields  
 Banfield, John . . 1C Falmouth  
 Barron, G. H. . . . 1C Hull  
 Bone, Edward . . . 1C Falmouth  
 Bowden, G. E. . . . 2C  
 Brady, Joseph . . 1C N. Shields  
 Brasford, E. J. . . 2C Hull  
 Caird, D. McD. . . 1C  
 Cordock, Thos. C. 1C London  
 Corlyon, W. H. . . 2C Hull  
 Crowder, H. J. T. 1C  
 Davis, Thos. W. 1C London  
 Donaldson, L. . . . 2C N. Shields  
 Donovan, J. J. . . . 2C  
 Dunlop, Thos. . . . 2C S'th'pton  
 Fawnes, J. . . . . 1C Aberdeen  
 Geary, G. W. . . . 2C N. Shields  
 Gibson, William 2C Liverpool  
 Harrison, Jno. B. 2C  
 Jack, William . . 2C Aberdeen  
 Kidd, John . . . . 1C  
 Kirkaldy, W. H. 1C N. Shields  
 Lawson, F. E. . . . 2C  
 Lee, M. W. . . . . 2C  
 Lehman, A. . . . . 2C Hull  
 Lindberg, Fred . . 1C Aberdeen  
 Lovie, A. W. . . . . 1C  
 Martin, Herbert 1C Hull  
 McCall, Wm. B. 2C London  
 Mirrifield, Alf. . . 2C Falmouth  
 Nelson, J. . . . . 2C N. Shields  
 Nichol, F. A. . . . 2C  
 Noble, Hy. C. . . . 2C  
 Press, Thos. C. . . 2C London  
 Priddell, A. . . . 2C Liverpool  
 Robson, Wm. . . . 2C N. Shields  
 Russell, T. A. . . . 2C  
 Spence, Robert . . 2C  
 Wawn, D. . . . . 1C  
 Weddle, Hy. M. . . 2C  
 Wilson, Robert . . 2C London  
 Wood, J. T. . . . . 1C N. Shields  
 Woolrich, F. G. 2C London

August 3rd, 1895.

Berry, N. . . . . 2C Cardiff  
 Biggins, J. . . . . 2C London  
 Bradley, T. . . . . 1C Cardiff  
 Burwell, W. . . . . 2C London  
 Croft, F. G. . . . . 1C Cardiff  
 Gibson, William 1C Liverpool  
 Gillies, Kenneth 2C Glasgow  
 Hawks, J. N. . . . 2C London  
 Hodder, J. . . . . 1C Cardiff  
 Johnson, C. . . . . 2C London  
 Jones, Ed. H. . . . 1C Liverpool  
 Keene, Wm. C. . . . 2C  
 Larkin, T. W. . . . 1C  
 La Roche, W. . . . 2C Cardiff  
 Lindsay, J. G. 2C Glasgow  
 Lloyd, M. . . . . 1C Cardiff  
 Low, P. McN. . . . 1C Glasgow  
 Macnab, J. . . . . 2C London  
 Malcolm, P. . . . . 2C Cardiff  
 McLaughlin, H. 1C N. Shields  
 McLellan, A. . . . 2C Glasgow  
 Minnikin, J. R. 2C N. Shields  
 Moody, R. . . . . 2C

Noal, F. W. . . . . 2C N. Shields  
 Richardson, R. 2C  
 Southcott, A. A. 1C London  
 Spencer, W. . . . . 2C Cardiff  
 Stevenson, A. M. 2C London  
 Strong, J. J. . . . . 2C Cardiff  
 Tallent, F. H. . . . 2C London  
 Varley, W. . . . . 1C  
 Wigley, D. J. . . . 1C

August 10th, 1895.

Alexander, J. R. 2C N. Shields  
 Ashton, C. H. . . . 1C London  
 Baharie, E. G. W. 2C N. Shields  
 Black, T. H. . . . . 2C London  
 Bolton, And. A. 2C N. Shields  
 Brown, J. . . . . 2C  
 Burns, J. F. . . . . 2C  
 Cowell, W. . . . . 2C  
 Greenhalgh, G. T. 2C Liverpool  
 Hudson, W. McC. 2C London  
 Kalliros, D. . . . . 2C Liverpool  
 Lloyd, W. H. H. 2C  
 Macdonald, D. H. 2C London  
 Mallett, T. . . . . 1C N. Shields  
 Martin, H. . . . . 2C  
 McLean, Thos. 1C Liverpool  
 Prockter, F. M. 1C  
 Reed, Hector H. 1C N. Shields  
 Turner, J. . . . . 1C London

August 17th, 1895.

Anderson, J. W. 2C Greenock  
 Baines, A. H. . . . 2C Hull  
 Ball, F. C. . . . . 2C Plymouth  
 Beal, F. H. . . . . 2C W. H'pool  
 Bond, H. T. . . . . 2C London  
 Bunting, W. T. 1C N. Shields  
 Campbell, J. O. 2C Greenock  
 Cartridge, H. . . . 1C Hull  
 Comrie Patrick. 1C Greenock  
 Donaldson, Jas. 2C Hull  
 Exton, E. A. . . . . 2C W. H'pool  
 Farmer, A. E. 2C London  
 Hawkins, C. L. 2C London  
 Holdsworth, A. 1C N. Shields  
 House, W. J. . . . . 2C Hull  
 Husband, J. . . . . 1C Greenock  
 Jacques, Jos. L. 1C W. H'pool  
 London, Thos. . . . 1C Leith  
 Macfarlane, A. 2C W. H'pool  
 M'Gregor, John 2C Liverpool  
 M'Neil, Harold . . . 2C  
 Pearson, Geo. P. 2C N. Shields  
 Prowse, Robt. . . . 2C  
 Robertson, J. . . . 1C Greenock  
 Rowland, E. . . . . 2C W. H'pool  
 Rutherford, Jas. 2C Greenock  
 Samuel, J. A. . . . 2C N. Shields  
 Scot, Ernest . . . . 2C London  
 Scott, Arthur . . . . 1C Hull  
 Scott, John B. . . . 1C Leith  
 Smythe, A. G. . . . 1C London  
 Stephens, Fred. 1C Plymouth  
 Stevenson, A. . . . 2C Greenock  
 Stewart, T. W. 2C N. Shields  
 Stock, Chas. . . . . 2C London  
 Strath, Alex. . . . . 1C N. Shields  
 Todd, — . . . . . 1C Greenock  
 White, Thos. A. 2C N. Shields  
 Willcox, P. F. C. 2C  
 Williamson, R. 1C Leith

# The Marine Engineer.

LONDON, OCTOBER 1, 1895.

THE recurring festival of the annual dinner of the Institute of Marine Engineers has again been celebrated on its fifth anniversary, on September 13th, at the "London Tavern," and was attended by a goodly and increased company, who took the opportunity to give a hearty welcome to the present president, Mr. A. J. Durston, C.B., R.N., the Chief Engineer of Her Majesty's Navy. As was remarked by the President himself, the election of Mr. Durston to the presidential chair is a special mark of the good feeling existing between the Mercantile and Royal Navy, and Royal Naval Engineers should now support in mass an Institute at whose head have been both the Chief Constructor and the Chief Engineer of the Royal Navy. The usual loyal toasts were warmly responded to by the meeting in the usual way, and the toast of the Army, Navy and Reserve Forces, proposed by Professor Elgar, with a reference to the large proportion of the personnel of the Navy comprised in the engine-room department, was responded to respectively by Mr. R. J. Butler, R.N., Colonel Davis and Mr. Manuel. In responding, Mr. Butler drew attention to the rapid introduction of fresh mechanical appliances in the Navy in the direction of increased efficiency in naval ordnance. Greater speeds and economy of fuel in engines and boilers is still the order of the day, and the new water-tube boiler was not forgotten. Colonel Davis very ingeniously associated the Army with the Navy by referring to the fact that his own battalion was present on board the fleet at the victory of the glorious 1st of June. Mr. Manuel, as representing the Royal Naval Reserve, regretted only that the proportion of engineer officers in that Reserve have not yet been permitted to practically qualify themselves for their important prospective service by actual sea-going experience on some of the battleships of the Navy. The President, in his later reply, expressed the confidence of the Admiralty in the Naval Reserve Engineers, even without such specific experience, but we think Mr. Manuel's suggestion was well founded. The Houses of Parliament were, of course, included in the complimentary toasts, as it is there that all strings are pulled affecting both the Mercantile and Royal Navies, and Mr. Fortescue Flannery, who has lately taken his seat in that House, hoped to see a larger representation of naval engineers both in the Commons and in the House of Lords, where he hoped the President might some day support Lord Kelvin in engineering debates. The toast of the evening was, of course, "The Institute

of Marine Engineers," proposed by Major W. E. Gilbert and responded to by the Hon. Secretary, who probably knew most about it, as he has had such an active participation in its formation. Looking back for the seven years since its foundation the Hon. Secretary was justified in saying its progress had been phenomenal. The death of Dr. Denny was spoken of with great regret, and his memory will be kept alive by the Denny Medal awarded each year for the best paper of the session. The busy programme for the Institute, just commencing for the session, was outlined by Mr. Adamson, and it served to accentuate the high purpose served by the Institute amongst both senior and junior marine engineers. "The Shipping Interest," proposed by Mr. A. Beldam, was amiably responded to by Mr. John Corry, who emphatically admitted the great dependence placed on engineers by the shipowners. "The Visitors" is always a popular toast, and was ably responded to by Mr. James Dunn, who recalled for the benefit of the meeting his experience of the strides in naval construction and engineering since the days of the old *Warrior*. "Kindred Institutions" brought Mr. B. Martell on his feet with the suggestion that so well was this Institute thought of by kindred professionals that if the Institute were willing to receive naval architects he was sure many would join. The usual toast to the President, and his able and gratified reply brought a most successful and pleasant anniversary banquet to a close.

THE season of fogs and collisions at sea is now upon us, and every short period seems to add to the shocking list of fatalities from this cause. Scarcely have we recovered from the disaster to the mail boat *Seaford* from Dieppe to Newhaven, when we are horrified by a similar catastrophe to the homeward-bound Netherland-American liner *Edam*, and though in both cases the crowning disaster of loss of life has been escaped, in both cases, for that very reason, the grave lessons to be learned from these sad occurrences are likely to be lightly passed over and disregarded. In both cases evidence has shown that the steam whistles of either vessel were heard distinctly upon the other, nor have we heard that there was any doubt as to the relative position of either vessel to the other when the fog whistles were heard. The doubt in such cases is always as to the respective courses that two approaching vessels are steering that eventually causes disaster. The captain or officer of the watch having no precise knowledge either of what course a vessel approaching him in a fog is steering, nor in what way she may alter her course if he alters his own, the course adopted is usually to slacken speed and continue on what may be colliding.

vessels sight one another. When this occurs it is usually too late to check the momentum of the colliding vessels until a collision has occurred, or the one that presents her broadside to the other when so close as to be visible, usually gets the worst of the collision. The temptation to remain bows on, as far as possible, is so great that we are not surprised to find that a collision is thereby rather accelerated than avoided. Surely such tendency could be absolutely avoided by the universal adoption of a simple code of signal whistles in fog, approximately indicating the course steered by each vessel, and by a general rule of the road to be adopted by each vessel so soon as their respective signals are heard. As an example of what we mean, if the compass were divided into four quadrants and all courses between north and east were indicated by one whistle, with an interval between—all courses between east and south by two sharp whistles, with intervals between each pair—courses between south and west by three, and between west and north by four, the approximate course of every vessel in a fog could be easily indicated and understood. In such cases whistles one and three, and whistles two and four would be approximately parallel courses in opposite directions, and the rule of the road might be that either vessel on hearing an approaching vessel with an odd number of whistles should each at once make their courses N.E. and S.W., and those with even-numbered whistles, two and four, should make their courses S.E. and N.W., which would bring their courses absolutely parallel. The sole remaining risk would be to meet absolutely stem on, against which the chances are enormous, and even if this happened, the chances of destructive damage to either is least, and the reversal of the engines might be early put in action when the sounds were right ahead, no swerving from the courses being permitted until the vessels were absolutely stopped and in sight of one another, when they could follow the ordinary rule of the road with due deliberation. Where a vessel with an odd number of whistles meets one with an even number their courses will intersect and the rule might be that the larger number of whistles give way to the smaller, or *vice versa*, and they would thus at once come to a parallel course. For instance, a vessel signalling two whistles meets a vessel signalling three, the vessel signalling three at once gives way, altering her course, to either two or four whistles, which must be accurately S.E. or N.W., whilst the vessel signalling two whistles, on hearing another vessel within ear-shot, must make her course accurately S.E. The two vessels are then obviously on parallel courses either following or meeting. If following, the latter vessel must slow or stop until the sound of the leading vessel has become inaudible, and

they can both then resume their original courses. It is the uncertainty at present as to what each vessel is to do when they become audible to one another that causes disaster, they each content themselves in the uncertainty by slowing until they either sight each other or pass by sheer chance without collision. Without doubt for half-a-dozen collisions that are heard of in consequence of disaster there are a hundred near shaves that are never heard of which have only missed being collisions by the law of average chances, no specific means being mutually taken to avoid collision, but the vessels trusting to such chances being at least largely in their favour.

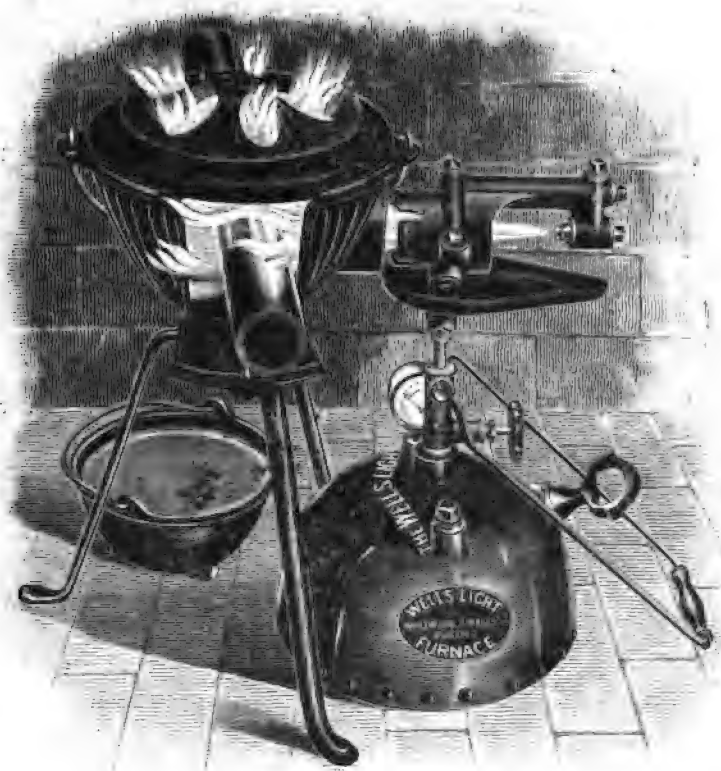
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MESSRS. JOHN PENN & SONS have just made what we believe is an unprecedented record in the speed of construction and completion of a first-class battleship. We refer to the successful completion by this firm of the battleship *Magnificent*, of 14,900 tons displacement, and 12,000 I.H.P. under forced draught. The period occupied from the laying of her keel to the first steam trials, which took place on the 29th and 31st of August, was only 20½ months, which speaks volumes as to the capacity of our private yards not only to do good and prompt work in times of peace and preparation, but also gives good assurance of what might be done under the pressure of war or hasty preparation for it. In order that private yards may be kept in a proper state of efficiency to promptly support the Royal Dockyards under stress of production of battleships and cruisers, it is evident that the Government should go out of their way to place constant and recurrent contracts for naval requirements with those private firms that have shown, or may be willing to show, that they are capable of producing battleships or cruisers. A good deal of interest will be evidenced in the performances of the *Magnificent*, as she is the first vessel of the Navy, we believe, that has been fitted with forced draught apparatus by induction, that is, without closed stokeholes. Great advantages as regards high evaporation, with least strain upon and damage to the boilers, has long been claimed for induced draught in place of forced draught by pressure, and we believe with justice, and the obvious increase of comfort to the stokers, and other advantages resulting from open stokeholds will, in our opinion, make the more general adoption of this form of forced draught a certainty. Of course in such good hands as those of Messrs. Penn & Sons, the engines, boilers, and vessel generally fulfilled all that was expected from her, and we may congratulate ourselves upon this splendid addition to our means of Naval Defence.

## PORTABLE FURNACE AND LIGHT FOR SHIP USE.

**M**ESSRS. A. C. WELLS & Co., of Carnarvon Street, Manchester, and London, have brought out a new combined heater and lamp, which they have termed their "Wells Light Furnace." This improved arrangement consists of a modified form of their well-known light, constructed to be used as a portable lamp, and also as a heater in conjunction with a furnace, suitable for heating rods, sheets, tubes, or plates, or for repairing purposes on board ship, as in straightening bulged or collapsed plates. The "Wells Light" used in connection with this

and pipes, rods, &c., can be heated up for bending in a very few minutes, whilst it can also be used for rapidly melting metals, the melting pot being placed inside the furnace. The "Wells Light," it may be added, is not connected to the furnace, so that it can be readily carried away by means of a handle and used as a light, giving from 500 to 1,000 candle-power. The whole arrangement, including furnace and light, does not stand more than 2 ft. 6 in. high, the furnace being supported on light wrought-iron legs, so that it can be readily carried about—whilst, being made in annealed metal, it is practically indestructible. The whole apparatus, of which we give an illustration, forms a very handy appliance for engineers and shipbuilders, as it can be readily carried about to any point



furnace consists of a dome-shaped tank with a small hand pump pressure gauge, and regulating valve. On the top of the dome a feed-pipe is fixed, which rises to the burner, the flame of which is horizontal and is directed into the furnace through an opening in the side. The burner used in this combined heater and light is of special construction, so that the flame possesses three times the heating capacity of the ordinary light made by the firm. The furnace is peculiarly adapted for heating up pipes, bars, &c., portions of the furnace sides being on hinges, so that they drop down to allow the pipe to go through the furnace, and a muffler plate, which is placed over the top, serves to break up the flame and divert the heat, which is thus directed round the pipe. Ordinary petroleum oil is used in the arrangement,

required. For heating and straightening plates which have bulged, a special form of burner has been designed with three generating chambers, and the arrangement of this burner is such that the flame can play in a vertical direction or at any angle required. A  $\frac{1}{4}$ -in. plate has been heated by this burner up to a white heat, in from 15 to 20 minutes. The Cunard Co. have adopted this form of heater for work on board their vessels, and several of them were used in making repairs on the *Campania* a short time back. In a subsequent issue we hope to give an illustration of the above burner with a more detailed description.

**The Additions to the Navy.**—Among the shipbuilding firms which have received invitations to tender for the naval work now being pushed forward by the Admiralty, is Palmer's Shipbuilding and Iron Co., Jarrow.

## INSTITUTE OF MARINE ENGINEERS.

ON Friday, September 13th, the fifth annual dinner of the Institute of Marine Engineers was held at the "London Tavern," Fenchurch Street, E.C., when Mr. A. J. Darston, C.B., R.N., the President of the Institute, occupied the chair, and the following vice-presidents were also present:—Messrs. Jas. Weir, Glasgow, A. Thomson, London, Alderman Kidd, West Ham, and A. W. Robertson. Members of Council.—Messrs. J. H. Thomson, chairman, J. Blelloch, A. Campbell, J. M. Gray, C. L. E. Melsom, C. G. Newby, J. R. Ruthven, S. C. Sage, J. T. Smith and W. White. Mr. R. Leslie, hon. treasurer, and Mr. Jas. Adamson, hon. secretary. Professor F. Elgar, LL.D., Colonel John Davis, A.D.C., Major W. E. Gilbert, Mr. B. Martell, Mr. R. J. Butler, R.N., Mr. James Dunn, Alderman and Sheriff Samuel, Mr. J. Curry, Mr. A. F. Yarrow, Mr. F. C. Marshall, Mr. R. Humphrey, Mr. A. A. Beldam, Mr. G. W. Mannel, R.N.R., Professor A. C. Elliott, &c.

After dinner the usual loyal toasts were introduced by the President and honoured with enthusiasm.

Professor F. Elgar, in proposing "The Army, Navy, and Reserve Forces," said: Mr. President and gentlemen, this toast requires very little in the way of preface to commend it to a company of engineers. The Army, Navy, and Reserve Forces are all services with which engineers are very intimately associated. The efficiency of those services depends very much upon the work done by engineers in providing them, not only with weapons but also with the means of transport, and with the various facilities required for the many operations they have to perform. With the Navy in particular, the Institute of Marine Engineers is intimately associated, because the *personnel* of the Navy is to a large extent constituted of marine engineers. I think about one-fifth of the whole *personnel* of the Navy—officers and crews—belong to the engine-room department. They form, therefore, a very important branch of the service, and what is more—a fact that we cannot forget this evening—at the head of that important branch is our friend the President of this Institute. Speaking as a very old friend, I am sure I may say all his friends feel that this Institute has not only conferred a great honour on Mr. Darston in electing him President, but they have also given him great encouragement in the performance of his duties—encouragement which will conduce towards the efficiency of the service. I ask you, gentlemen, to drink this toast very heartily, and with it I would couple the names of Mr. Butler, Colonel Davis, and Mr. Mannel—one of your past presidents.

Mr. R. J. Butler, R.N., in responding, said: Mr. President and gentlemen, permit me to heartily endorse all Professor Elgar has said respecting our noble President. I have not the honour to be a naval officer—my connection with the Navy is more on the side of the *material*. The changes which have taken place in our Navy within the last 10 years have been enormous. The improvements which have taken place have been largely in the direction of increased efficiency in naval ordnance. We get greater power out of our weapons, quick-firing guns have been added, and quick appliances have also been added to ordinary manual-worked guns. Smokeless powder has been introduced, and higher speeds than hitherto have been realised, with economy in the consumption of coal, and economy in weight. It is true, perhaps, that the reduction in weight and the increase in speed have been largely obtained by the use of the type of boiler termed "the water-tube." If it had not been for this boiler the results now obtained would have been impracticable. With ships built last year a speed of from 26 to 27 knots was realised, and those to be built will probably attain a much higher speed still. In all these, some type of the water-tube boiler, with high forced draught, will be fitted. Large sums of money have been voted in recent years for the construction of ships, and it is a satisfaction to be able to say—judging from the reports of naval officers—that the money has been well spent. And we have every reason to believe that if an emergency should arise, our officers and men will make the best use of our ships and material, and will emulate the deeds of our forefathers.

Colonel J. Davis, A.D.C., in acknowledging the toast on behalf of the Army said: Mr. President and gentlemen, in an assembly like this it might seem, at first sight, as if the "Army" were a little out of place, except as a national toast. But it is not out of place. The Army and Navy in the olden times were inseparably connected, and the regiment of the old Queen's—a battalion which I have the honour to command—on the glorious 1st of June the whole regiment was on board her Majesty's fleet,

and helped to win that great and memorable victory. Mr. Butler has spoken of changes in the Navy. It is a time of change also in the Army, and I regret exceedingly, from personal esteem, that the grand old Duke, who has done his duty so nobly and well at the head of the Army, is now about to retire. He has occupied the very foremost position nobly and well, and no more loyal and brave gentleman ever served her Majesty. He retires with the good wishes and loyal thanks of every subject of the Queen. He is to be succeeded by one who will worthily carry out the changes which the Administration have thought fit to make. Lord Wolseley has, in all his career, done gallant service. In every action, and in every command he has had, he has been successful, and he has also done his duty as administrator of the Army, and so become fitted to succeed to the post he is now to occupy. There are other grand soldiers, too, coming forward. I need only mention Sir Evelyn Wood, Sir Redvers Buller, and, not to mention others, one soldier for whom I have a great regard—Sir Francis Granville. In thanking you for coupling my name with this toast, I will only add that I believe the Army must depend in a great measure upon the genius and skill of engineers for many things that have helped to win battles in recent years.

Mr. G. W. Mannel, R.N.R., who, on rising, was greeted with loud cheers, said: Mr. President and gentlemen, I thank you on behalf of the Royal Naval Reserve. I can only say the Reserve well deserves the distinction, although as yet we are not tried veterans. We have to carve our name yet, but so far as the Reserve has gone, especially with the officers, I think they have shown that when the time comes they will be equal to the officers of the Royal Navy. They have been tried on several occasions, and occasions sometimes of particular danger, and they have stood well, and have received the thanks of the Lords of the Admiralty. For ourselves, as engineers of the Royal Naval Reserve, we can say but little. In fact we are not in touch, as yet, with the work of the Navy. Ignorant as we are of many things which all engineers ought to be acquainted with before the time actually comes for going on board a man-of-war, our ignorance is not our fault, and we will show, so far as our knowledge of things we do understand is concerned, that we will do our duty. We feel sometimes like a locomotive, with steam up, but chained in a shed—we cannot get away. The officers in the Reserve number 1,370. Of these, a small part only are engineers; they number at present about 300. Their services, however, are important, and I will say this—those services cost the country nothing. Out of the total number of officers 1,070 are paid—or will be, after receiving certain drill which can be gone through in a year. That money comes to £18,000 a year. I only wish to point out that the engineers are untried men. But we have been appointed engineer officers, and have a right to do our duty. We think that if the Admiralty leave us ignorant of what we ought to know about a battleship, it is their fault. I wish we could be tried so as to become fit as engineers to go on board anything when the call comes, from a torpedo boat to a line-of-battle ship. We feel we should like to be able to step on board any class of vessel ready to go to our work at once. We should like the engineer officers to be tried men, and have a connection, more than in name, with the Navy. Gentlemen, we are proud as engineers. I do not think many ships in the Royal Navy could go to sea without engineers—though of course the naval officers do their duty in their own way. I hope that what I have said will not be taken amiss, even by the Admiralty. I am very pleased to see our President here to-night. I have been associated with him in the Admiralty at different times, and I feel that in the position which he holds there he is the square rod in the square hole.

Mr. Archibald Thomson, in proposing "The Houses of Parliament," said: Mr. President and gentlemen, I feel a highly honoured man to-night as I look down this toast list and find my name as the proposer of "The Houses of Parliament." We all know, and fully appreciate, the greatness of Parliament. When we remember that these gentlemen—the members—voluntarily come forward, give their services, and work hard in every shape and form, we must feel that we are greatly indebted to them. I trust the day is a long way off when Members of Parliament will receive remuneration. If I had to treat of all the important duties they discharge I should hardly know where to begin. They not only legislate for this nation, but also, to some extent, for nations and empires beyond the seas. We often hear that the Parliament of this nation is the greatest assemblage in the world. It is the most important. Without attempting to say one word on either



side in politics—because I do not profess to be a politician—I only understand politics from my own little ken—I think I may venture to assert that the nation has just come through a great fight and that it has put down its foot in a most decided manner, but in a manner which the great portion of the nation is thoroughly satisfied with. I must confess I have a very great opinion of the happy mixture they have made. I think we have good men from the two great parties of the State, and I am prepared to expect something good from them. If they would only do something to increase freights—I was going to say they might almost let loose Ireland. Judging from the Board of Trade returns for August, it seems as if we shall have something bright before us soon. Now, what we have to do is to wish “God-speed” to the Houses of Parliament. I think engineers know when they have got the right men, and I am sure most of them—there may be a few red-hot Radicals amongst them—feel we are in the right direction now. Gentlemen, I give you “The Houses of Parliament,” coupled with the name of Mr. Fortescue Flannery, who, as you are aware, has lately taken his seat in the House of Commons.

Mr. Fortescue Flannery, M.P., in reply said: Mr. President and gentlemen, I remember that at a former dinner of this Institute this toast was responded to by my friend Mr. William Allan. From his long experience in the House he was able to tell us much about its procedure, and to describe it. I cannot pretend to any experience, and therefore must be brief. As to the House of Lords, engineers know very little about it—less of its interior than, as a class, they deserve to know. It may be that in the future we shall have other engineers there than Lord Kelvin, one of the past presidents of this Institute. I should not wonder if, in course of time, sir, when you have improved the administration of the engineer branch of the Navy, you should ultimately find yourself reposing on those scarlet benches. You would carry with you there the esteem and respect of your brethren in the profession, and you would find in the House of Lords that there is a place where House of Commons critics cease to trouble and water-tube boilers are at rest. With regard to the House of Commons, I have found that if a member really understands the subject on which he is speaking, and has any real contribution to make to the debate, he is invariably listened to with respect. As engineers we are well represented—not so much numerically as by a good representation. I have spoken of Mr. William Allan—he has gone up by leaps and bounds in public estimation because he has stood up for the profession. Then we have John Benn, representative of a large Glasgow house. Then we had—I did hope we should have been able to say “we have”—the great engineer, Sir Edward Beed. Whatever our politics, I am sure we are sorry the House should have lost that great representative of marine engineering who so sturdily stood up for engineers. Then Colonel Denny, who was with us last time, and who is now the baby of the House of Commons. I remember the graphic description he gave of the dangers run by engineers and stokers battered down in the close stokehole in the hour of battle. Then we have a strong representative in Mr. Doxford. There are others, but I have mentioned sufficient to convince you that your interests are well represented in the House. I believe there is no class of men who, in proportion to their numbers, are better able to sustain the greatness of this country than engineers, and if this Institute will pull itself together and make itself a representative power of the thousands of engineer officers in the Royal Navy, and of the 30,000 in the Mercantile Marine, its influence will be felt in the councils of the nation, and many abuses will be removed by Parliament if pressure be brought to bear. I believe when, a few years hence—I hope it may be six or seven—we look back on the work of the Parliament now beginning, it will be seen that it has done much for this country which depends, more than any other, on commerce and shipping—done much good for this generation and for generations still to come.

Major W. E. Gilbert, in proposing the toast of the evening, “The Institute of Marine Engineers,” said: Mr. President and gentlemen, I have had conferred upon me the honour of proposing this toast. All I can say is that I congratulate the Institute upon the position it is in, and I am sure that year by year it will improve and go on flourishing. The nation is certain indebted to marine engineers in many ways, and I am certain that with their assistance it will make marked progress. I beg, therefore, to propose the toast, and to couple with it the name of the honorary secretary, Mr. James Adamson.

Mr. James Adamson, who was loudly cheered, said: Mr. President, Major Gilbert, and gentlemen, I rise with pleasure, in the name of the Institute of Marine Engineers, to respond to the toast which you have so enthusiastically received. I thank the proposer for the kind expressions to which he has given utterance—expressions which convey to the Institute an assurance of his sympathy with its work. And, gentlemen, assurances of sympathy have not been wanting on your part in the reception you have accorded the toast. Standing, as I do, at the junction of the channels of these two waters of sympathy, I thank you on behalf of the office-bearers and council for the presence and support which you have accorded us at our festive board. Peace has gained much and possibly has learned more from war, and, amid much of the folly and nonsense of the chivalry with which the employment of war in the Middle Ages was surrounded, there was in it the true ring which helped to shape the manners and morality of later days. The noble and elevated spirit which the soldier displays before the nation tends to elevate and ennoble it, considered apart from the carnage and misery which no doubt war brings in its wake, and I think on this occasion, when we are honoured by those who represent the leaders of our legions, and when the representations on the walls around us remind us of the olden chivalry, it becomes as well to consider whether we cannot press upward and forward, with loftier aims and more extended labours in connection with the Institute under whose banner we meet to-night. It is now seven years this month since first the preliminary arrangements in connection with the foundation of the Institute of Marine Engineers were commenced. On more than one occasion since then, in connection with the rise and progress of the Institute, men well qualified to write and speak on the subject have declared that its progress has been phenomenal. Gentlemen, let us go forward in the work to which we have set our hands. Let our progress in the future even surpass the work in the past, as has been already indicated by Mr. Flannery in his speech to-night. The Institute of Marine Engineers, we may say, can now stand alone, and has justified its foundation as one of the institutions of our country, coming forward to support the pillars of peace, and also the buttresses of war. Gentlemen, we have lost one of our most honoured members but lately, and when we consider the words of encouragement given to us, and no less the deeds of encouragement shown us by our late friend Dr. Denny, when we consider the pleasant associations which we have had with him in the past—we regret they are of the past—I say we cannot but linger on their remembrance, because they are pleasant memories to us. The gift of Dr. Denny made possible the “Denny Medal,” which is awarded each year for the best paper of the session. One of those medals has gone to India, another to Valparaiso, and the third to Cardiff, as but recently the medal has been awarded to Mr. T. W. Wallis for his paper on “Wrecks and Sunken Vessels.” We are now about to resume our session. We are hoping that our respected President will come and give us his inaugural address at the Institute premises on the 23rd of September. Our drawing classes will resume in October, and our papers and discussions will be held on the 2nd and 4th Mondays of each month, the first paper being read on the 14th of October. This paper has been contributed by one of our members resident in Hong Kong, on “Internal Friction in Steam Engines,” suggested, I believe, largely by the paper with which Mr. Northcote favoured us. And now, to comply with the wholesome rule to keep within the prescribed limits, I will thank again the proposer for the kind way in which he has referred to the Institute. His words were brief, but well chosen, and we ought well to consider them. If we do so, then from this night we may date a new epoch in our history. I ought, however, before sitting down, to state that the conversazione—the popular function in connection with the Institute—will be held in the beginning of December. Ere I sit down, I say, may the Institute flourish more and more in the days to come; may we seek after those things which are noble in connection with our profession, and use the opportunities which are within our reach day by day, and year by year; and so may our work go on, extending and prospering, as time passes over us here and hereafter.

Mr. A. Beldam next proposed the toast of “The Shipping Interest.” Referring to low freights, and their cause, he said he thought that in recent years the increase of tonnage, and the increase of speed had been greater than the expansion of trade. The improvements in shipbuilding had been so important that steamers built only eight or ten years ago were now at a great

disadvantage. He coupled with the toast the names of Mr. John Corry and Captain F. A. Harrison.

Mr. John Corry replied. He thanked them for the cordiality with which they had received the toast. The Institute of Marine Engineers was so closely connected with the shipping interest that they were practically inseparable. Shipbuilders had to depend upon engineers for the propelling power, and engineers upon builders for the ships. With regard to the state of trade they were hoping for better times. After a storm came a calm. The condition of shipping at the present time was this—they built a ship, but they did not know how long it might be of service. Engineers, perhaps, thought it was to the interest of shipowners to make the greatest possible improvements in engines. It might be for the man who built the last ship. The advance of improvements was so rapid that he did not think much less than 10 per cent. would be sufficient for the depreciation that had taken place in steamers 10 years old. They had battled, however, with difficulties in the past, and were prepared to face them in the future. They had to contend with foreign competition and bounties, but the great thing they had to fear was too much competition amongst themselves. The determination of builders and engineers to build the finest steamers at a mere nominal price, tempted into the shipping trade people who knew very little about it. The shipowner who built to fill up vacancies—that was the class of shipowner he should like to see more of, but unfortunately they were becoming fewer.

Mr. J. Macfarlane Gray, who was loudly applauded, proposed "The Visitors." The Institute was always glad, he said, to welcome visitors who were interested in the subjects discussed. There were many present that night—guests of members. The Institute welcomed them, and also welcomed its honorary members, some of whom were too much of the nature of "visitors." They would like to see them more frequently. They had also present a large number of distinguished guests, each one eminent in some profession kindred to engineering, and therefore kindred to engineers by a kinship depending, not upon having the same blood in their veins, but upon having the same kind of wrinkles in their brains. The great engineering family was a sort of brotherhood of the wise, because it was alone by wisdom which dwelt with prudence that men found out knowledge of witty inventions—and whatever was the outcome of the dwelling together, that was engineering. Colonel Davis testified by his presence that he recognised the kinship. In the repair of a 28 in. shaft in a rough voyage across the Atlantic very much the same kind of genius was displayed as in the Oritral expedition. The Himalayas and the Atlantic were merely differentiating circumstances. Amongst the distinguished guests named by Mr. Gray were Mr. Mansell, of St. Peter's, Mr. Robert Humphreys, Mr. Yarrow, Mr. John Corry, and Mr. James Dunn (with whose name the toast was coupled). Mr. Dunn, the speaker said, was acting in the place of Sir William White, one of their past presidents, and he also was very much associated with their present President. They were glad to see him, and they desired him to express to Sir William White their regret at Sir William's illness. They also welcomed the presence of Mr. A. Wood and Mr. R. Butler, of the Admiralty, as a token of that closer union which must be established between the two great navies if one Navy was to protect the other. Then they had Dr. Elgar and Major W. Gilbert. The last named, in proposing the toast of "The Institute," had said much in their favour. They could only attribute Major Gilbert's kind remarks to his official ignorance of them, because he was chief constable of the Metropolitan police at Scotland Yard, where he never saw a marine engineer. The speaker asked them to join heartily in drinking the toast of "The Visitors."

Mr. James Dunn responded, thanking Mr. Gray for the kind and characteristic way in which he had proposed the toast, and the company for the hearty way in which they had received it. He especially thanked the Institute for their courtesy in inviting them to meet so many distinguished engineers. The Institute was comparatively young, but they had made their mark during their seven years' existence. They had, during that time, had a succession of distinguished men as presidents. In their meetings questions of vital interest to the profession had been discussed. With respect to one of their presidents—they would never see him again, but they all held the name of Peter Denny in blest remembrance. Another of their presidents was unable, on account of illness, to be with them that night. The speaker thanked Mr. Gray for his sympathetic reference to the illness of his (the speaker's) chief. They were delighted to see in the chair that

night the gentleman who was engineer-in-chief to the war fleet of Great Britain. In choosing him as their President they had shown a wise discretion which augured well, for it showed that they had enlarged views of a cosmopolitan kind. In Sir William White they had had a naval architect, in Sir Thomas Sutherland a shipowner, and they were at that moment listening patiently to another naval architect. He would express the admiration he felt at the great ability shown, the marvellous strides made, the wonderful results achieved, and, as was referred to by Mr. Flannery, the great bravery again and again displayed by marine engineers. His connection with engineering went back a long time. He had been associated, in a greater or less degree, with the design of every British warship at present carrying the British flag. It was almost startling to look back and call to mind the marvellous strides that had been made. He was employed on the design of the *Warrior*—the first armour-plated ocean-going ship. She carried 4½ in. armour on her sides. In a short time they were using, instead of 4½ in., 24 in., and now, at the present day, they were using 12 in. plates, with a greater resisting power than the 24 in. of a few years ago. That very *Warrior* also carried the heaviest gun then made—a 68-pounder. In the course of time they got up to a 100-ton gun, throwing a shot of 2,000 lbs. They were now mounting guns which weighed only 46 tons, but which hurled projectiles of greater piercing power than the 100-ton guns did. With regard to engineering, where on the *Warrior* they required 200 tons of coal for 1,000 H.P., they now required only 150 tons, and in a ship recently tried only 100 tons. Further, Mr. Yarrow had given 1,000 H.P. with only 25 tons of weight. He expressed a hope that the marine engineers would allow naval architects to go hand-in-hand with them. The Institute of Naval Architects embraced, when it had been about 10 years in existence, marine engineers in its full membership. He would not prophesy what that Institute would do.

Mr. J. G. Hawthorn (in the absence, through illness, of Mr. W. H. Northcott) proposed "Kindred Institutions." They were all children, he said, of one family, and he hoped he should live to see the day when they would be all united in one Institute, worthy of the world, having a building in London worthy of Europe, and with their electrical section, their marine section, their civil section, and their mechanical section. He coupled with the toast the name of Mr. Martell.

Mr. B. Martell, in acknowledging the toast, said that perhaps the Council of the Institute might take into consideration the remarks of Mr. Dunn, and consider whether they could not elect naval architects amongst them. If they could, naval architects would consider it an honour to become members of their Institute, just as the Institute of Naval Architects considered it an honour to elect marine engineers. With regard to the toast, he felt it was a great compliment to have his name associated with it. He did not believe with some that in such institutes they did not get the best out of their members, for the reason that if they really had anything of worth to communicate they would keep it up their sleeves until they could benefit themselves. He had not found that to be the case. Those who had any acquaintance with the working of such institutes must admit that they were of enormous value to the country generally, and to the professions in particular. If he wanted an illustration of that he need only refer to the "Transactions" of that Institute. It was a matter of great congratulation indeed to see these institutes multiplying and progressing in the country.

Professor A. C. Elliott proposed the health of the President. He said it was at once a difficult task and an easy one—easy because the toast had only to be mentioned to secure its hearty acceptance, but not easy to find words in which to express appreciation of their President's qualities. Mr. Durston was not only Chief Engineer of the Navy, but the most distinguished Chief Engineer. Upon his shoulders the heaviest burden had fallen, because of the recent Naval Armaments Act. When the speaker looked to the fact that one of their past presidents was Chief Constructor to the Navy, and the present president was Chief Engineer of the Navy, he seemed to see the finger of Fate pointing to the time when the Institute of Marine Engineers would embrace the Royal Navy. The toast was "The President," might he live 1,000 years.

The toast was honoured with great enthusiasm.

The President, who on rising to respond was loudly cheered, said: Gentlemen, I am particularly grateful for the manner in which Dr. Elliott has proposed my health, and for the cordiality with which you have received it. The flattering terms in which

you gentlemen have spoken of me I can only ascribe to the good work done in the Admiralty dockyards and by my brother officers—over 800 of them—of the naval service with which I have the honour to be associated. With regard to the Royal Naval Reserve, Mr. Manuel feels we do not use them as we should do. He said the Naval men are veterans and the Reserve men are not. Gentlemen, they are as great veterans as one could wish, for they do their duty to the country, and what more can men do? We look upon them as one of our pillars. Gentlemen, with regard to the position I occupy to-night, it is, I am sure, a special mark of the good feeling existing between the Mercantile and the Royal Navy. I thank you for the honour you have done me in electing me. Your Institute has recently suffered a great loss in the death of Dr. Denny. Your consolation is that he passed away full of years, and enjoying the honour and respect, not only of marine engineers, but also of all with whom he was brought in contact. We experience another loss to-night in the absence of my most intimate colleague Sir William White. He is laid by from efforts exerted in the cause of his country—efforts as brave as those of any hero. I am sure you will join with me in an expression of sympathy with him in his suffering, and in a hearty wish for his speedy recovery. On a recent occasion, in replying to a toast, an admiral of the United States Navy expressed his opinion that "Jack"—the man behind the gun—possesses the same good qualities as ever. I venture to remind you that the "Jack" with whom you and I are most acquainted—"Jack Stoker," the man behind the fire—is of the same stuff as his brother before the gun. His duties, unfortunately, are nearly as laborious as ever, and if marine engineers can devise and put into practice some means by which his labours may be reduced, and his surroundings improved, they will deserve well of their country. I submit it as a matter worthy the attention of the Institute. The President having alluded to the probable development of traffic across the Atlantic and between Australian and Pacific ports, and to the girdling of the northern hemisphere by the efforts of Russia, concluded by saying that this girdling of the earth in the interests of commerce was the best means of ensuring the unity of nations and developing human brotherhood. He ventured to predict that in that grand work marine engineers would play no unimportant part.

## LAUNCH OF ANOTHER BIG DREDGER AT BARROW.

ON the 7th of September the Naval Construction and Armaments Co., Limited, launched from their yard at Barrow a second twin-screw hopper and sand-pump dredger for the Mersey Docks and Harbour Board. She was named the *G. B. Crow* in compliment to the chairman of the leading committee of the Board. In many respects the *G. B. Crow* is a sister ship to the *Brancher*, built by the same company for the same owners a couple of years ago; but some account of her general characteristics will be of interest because in some important points she differs with the *Brancher*, fully described in these pages some time ago. The *Brancher* has done very good work since she was put on her station at the entrance to the Mersey as the following particulars will show:—

	Bar. Tons.	Channel. Tons.	Total. Tons.
July, 1893, to July, 1894 ..	3,599,600	65,250	3,664,850
„ 1894, to „ 1895 ..	2,783,950	1,730,550	4,514,500
		Total	8,179,350
Work done by other dredgers since September, 1890			3,899,250

Total 12,078,600

Depth in channel at dead low water, originally 11 ft.; now there is a buoyed out or channel, 1,500 ft. wide, in which there is 23 ft. of water at dead low tide.

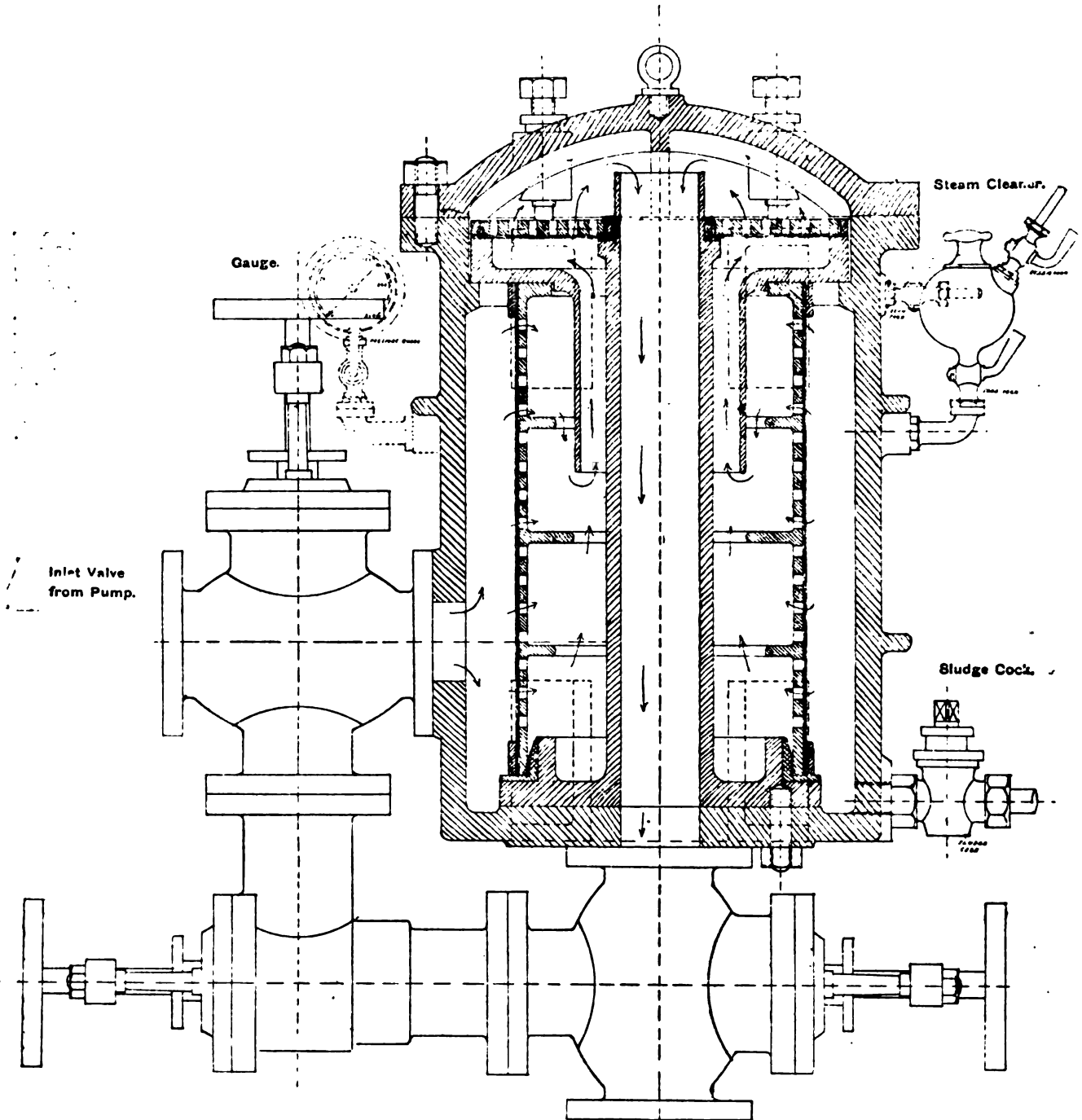
The pumps of the *Brancher* were designed to dredge 4,000 tons of sand per hour. As a matter of fact, on her station, they have occasionally lifted at the rate of 6,000 tons of sand per hour, the rate of dredging varying with the sharpness of the sand, which affects the ratio of sand to water lifted, and the loss of sand in overflow. The *G. B. Crow*, which is built of steel to Lloyd's highest class, is 320 ft. in over-all length, 46 ft. 10 in. moulded breadth, and 20 ft. 6 in. moulded depth. The boilers and propelling engines are at the aft end of the vessel, the

pumping machinery at the fore end, and the sand hoppers amidships. The propelling machinery consists of two sets of triple-expansion engines, working separate screws. The boilers, which supply steam for the pumping engines as well as the propelling engines, are constructed for a working pressure of 180 lbs., the speed of the vessel fully loaded being 10 knots. The pumping machinery consists of two centrifugal pumps, each having 36 in. suction and delivery pipes, and each worked by a separate triple-expansion engine. The suction tube, which is raised and lowered through a well between the forward sets of hoppers, is 3 ft. 9 in. in diameter, and can be lowered so as to dredge from a depth of 45 ft. below the surface of the water. The raising and lowering of the tube is done by a hydraulic lifting apparatus, preventer chains and gear being also fitted, so that, in the event of accident to the hydraulic gear, it may be lifted by tackle led to one of the deck winches. The two pump suction tubes are connected to a T head at the top of the suction tube, the T head forming the pivot round which the tube hinges in being lowered or raised. Close under the T head the tube is fitted with a ball and socket joint, which allows the tube some transverse swing with the limits of the well. The valves are so arranged that each pump may be disconnected from the suction tube, allowing one pump to work alone should the other break down. The bottom end of the tube is fitted with a swelled nozzle turned at right angles to the axis of the tube, and fitted with a grid to prevent stones and other large material from entering. The mixture of sand and water delivered by the pumps is carried along over the top of the hoppers in two landers or troughs, one over each set of hoppers (port and starboard), the material falling from them into the hoppers through adjustable openings or doors in the bottom of the landers. The hoppers, which, as has been stated, occupy the middle part of the vessel, between the boiler-room and the pumping machinery, have capacity for 3,000 tons of sand, exclusive of the capacity of the hatches, which project above the deck. The hoppers are eight in number, four each side of the centre line, the three forward pairs being divided by the well for the suction tube, and the after pair by a centre line bulkhead. The hoppers' sides and ends are vertical for the greater part of their depth, but the lower part is shaped like an inverted truncated pyramid. The apertures on the ship's bottom through which the sand is discharged are circular, and are opened by a valve lifted by hydraulic gear, the valve being connected to a tapered trunk which extends to the top of the hopper. When the sand is to be discharged, the trunk and its attached valve are lifted, and water forced into the interior of the trunk, whence it is ejected into the hopper through an annular opening in the trunk just above the valve. This water washes the sand out through the aperture in the ship's bottom, the sludging operation being assisted by jets of water ejected from pipes led all round each hopper, at about half the depth above the bottom, and by water played on the top of the sand from auxiliary landers running round each hopper; the method of discharging and the arrangement of valves and trunks being the patented design of Mr. G. F. Lyster, engineer to the Mersey Dock and Harbour Board. The handles for controlling the water service and the hydraulic valve lifting gear, are grouped together for each hopper on a fore-and-aft gangway running the whole length of the hoppers. The controlling gear for tube lifting and lowering, and for the pumps, is in a deck-house on the flying bridge, where along with telegraphs to the pump room are placed indicators showing depth of nozzle under water, vacuum in suction tube, and pressure in hydraulic main.

The launching ceremony was performed by Mrs. Bushell, wife of Mr. Reginald Bushell, a member of the Mersey Board, and that gentleman in replying to the toast of "Success to the *G. B. Crow*," said the new vessel embraced such improvements on the *Brancher* as their experience of that vessel suggested. The work the *Brancher* had done had been a great success, and owing to the dredging she had been able to accomplish, the largest class of American liners could now come into the port of Liverpool at any state of the tide. He did not think they could have any better guarantee of the success of the *G. B. Crow* than that already achieved in the success of the *Brancher*. Before the dredging operations were started on the Mersey there were only 10 ft. at low water spring tides over the bar. They could easily imagine that in these days of rapid transit, when people were hurled from one place to another in a marvellously short space of time, and even across the Atlantic in under six days, it was a very serious thing if big vessels like the *Campania* and *Lucania* had to be delayed at the entrance to

the *Mersey* after a smart passage across the Atlantic, and after every effort had been made to keep her passengers the shortest number of minutes on the water. First of all they fitted up small barges as sand pump dredgers, and finding that the

springs, and they had secured this depth for a width of 1,500 ft. As was the case with all things, engines to do this work were liable to go wrong just when they were perhaps most wanted, and as in some cases an accident might keep the *Branker* off



principle on which they worked was satisfactory, ultimately the order was given to the Barrow Co. for the building of the *Branker* to lift 4,000 tons of sand per hour, and with carrying capacity in her own hoppers for 8,000 tons of sand to be deposited elsewhere. They soon got this vessel to work, and they had now on the bar at Liverpool 23 ft. of water at low

her work, perhaps for some months, it was thought wise of the Board to order a duplicate vessel in the *G. B. Crow*.

This vessel is being rapidly completed on the engineering side of the Barrow Co.'s yard, and in about six weeks will be ready to go on her trials.

## IMPROVED "EDMISTON" PATENT FEED-WATER FILTERS.

NOW that filtration of the feed-water has passed from the experimental stage to every-day practice it behoves steamship owners to carefully note that when fitting this class of machinery they place in the hands of their engineer staff an adjunct that will be of sound practical service.

The Glasgow Patents Co., who introduced the first marine feed-water filters in 1892, have recently placed on the market some new designs and modifications of the original "Edmiston" filter, which leaves nothing to be desired in efficiency and ease of working.

As will be seen from the accompanying illustration, this filter is provided with a steam cleaner which renders it specially suitable for vessels engaged in steaming long distances, and when this cleaner is regularly used, say once a week or so, the filter will run without opening up for several weeks. As shown, the filter is fully mounted with pressure gauge, soda cock, air and scum cock, sludge cock, &c. When in operation two filtrations are obtained, the first through the large inner cylinder, and the second through the perforated grid on the top. The *modus operandi* is as follows:—The water from the feed-pump enters by the inlet valve, and passing through the perforated cylinder, covered with filtering cloth, is thereby deprived of its fatty matter and any metallic oxides. It then passes up the annular space between the baffle plate and the inner tube, and through the grid on the top of the chamber, on which is fixed another layer of filtering material capable of extracting the lightest of the oily matter held in suspension. The water, it will be seen, is thus *twice filtered* in the chamber before it finally passes out to the boiler (or heater, as arranged) through the outlet valve at foot. When the cloths are foul, clearly indicated by the rise of pressure on the gauge, the by-pass valve is opened, and the inlet and outlet valves closed. Steam, with or without an admixture of soda, is blown in, and commingling with the water in the filter, boils the cloths for a minute or two, after which the sludge cock is opened and steam allowed to blow through for say one minute, when the filter is ready for work again. Air and scum cocks are provided to extract any air or oily matter which may gather in the filter cover.

The advantages obtained by this combination are:—

1. Double filtration; 2. Delivery of water at position where it is purest; 3. Large receiving space, reducing speed of travel; 4. Large filtering surface; 5. Self-clearing—without opening up—thus enabling the engineers to run from port to port with only a blow through once a week.

The chief engineer of the s.s. *Braemar*, writing from Yokohama, testifies that "the filter works well, and that when blown through *once a week* with steam and soda it runs the vessel's longest passages, 18 to 30 days, without being opened up, and further, he states that the boilers, when opened up at Shanghai after 10,000 miles steaming, looked remarkably well for new boilers, no signs of grease being seen on any part of them.

The Glasgow Patents Coy., Ltd., of 11, Bothwell

Street and Wellington Works, Kinning Park, Glasgow, will furnish any further information.

## LAUNCH OF A FAST TORPEDO-BOAT DESTROYER AT JARROW.

THE fast torpedo-boat destroyer H.M.S. *Porcupine*, designed and engined by the Palmer Co., was successfully launched on the afternoon of September 19th, at Jarrow, the christening ceremony being performed by Mrs. A. M. Palmer, of Newcastle, wife of one of the directors of the Palmer Co. The vessel is the third of the same class built by this firm for H.M. Government. Her dimensions are:—Length, 200 ft.; breadth, 19 ft. 9 in.; displacement about 280 tons when ready to be commissioned.

She will be armed with one 12-pounder gun, and five 6-pounder guns, one of the latter being placed on an elevated platform aft, and four on the broadsides. The 12-pounder gun is mounted on the top of the conning tower forward, and by reason of its extreme elevation and wide range of fire will be a very efficient weapon for the purpose of destroying torpedo boats. There will be two single revolving torpedo tubes fitted amidships, which will enable her to act as a torpedo boat when required. She has also a powerful electric search light.

The officers and engineers' cabins are arranged abaft of the engine-room, and forward there is accommodation for fifty men.

The builders have guaranteed a speed of 27 knots per hour, and the machinery, which has also been designed by them, consists of two sets of triple-expansion engines, in one compartment, of a special design to suit the high rate of speed. Steam is supplied by four of Reed's (manager of the engine works department) patent water-tube boilers, constructed by the builders, fitted in two separate watertight compartments with the necessary fans for supplying air under forced draught.

The whole of the boilers and machinery were on board when the vessel was launched, and she is practically ready for her preliminary steam trials.

The sister ship *Janus* has already been accepted by the Admiralty after having undergone her official speed and gun trials, the speed attained being 27·8 knots during three hours' continuous steaming, and under very unfavourable conditions with regard to weather. The builders have given great consideration to the stiffening of the ship, and the balancing of the engines in order to minimise as far as possible the vibration which at high speeds forms so objectionable a feature in many boats of this class on account of the lightness of construction, and their efforts have been eminently successful, as a marked feature of the trials of this vessel was the absence of vibration.

The second vessel, the *Lightning*, has completed her preliminary trials, and is now ready to leave the builders' yard for Chatham, where she will undergo her official trials, and it is anticipated she will be taken over by the Admiralty in a week or two.

Mr. A. T. Aslett, Admiralty overseer, has superintended the vessels during their construction.

After the launch of the *Porcupine*, the visitors adjourned to the company's model-room where they partook of light refreshments. Colonel English, the general manager, proposed success to H.M.S. *Porcupine* and thanked Mrs. Palmer for having christened the vessel. The toast being enthusiastically drunk the company dispersed.

**A Record American Cargo.**—The *Georgic*, the latest addition to the cargo-carrying fleet of the White Star Line, on her first voyage from New York to Liverpool, had on board the largest general cargo that ever left America. The following entries are in her freight list:—750 head of cattle, 9,000 sheep, 3,000 quarters beef, 136,000 bushels of wheat, 90,000 bushels of corn, 550 bales of cotton, 2,000 sacks of flour, 1,800 bags of oilcake, 1,800 cases of oatmeal, 1,700 boxes of bacon, 300 barrels and tierces of provisions, 9,000 packages of lard, 3,900 barrels of resin, 700 barrels of glucose, 1,000 cases of canned goods, 300 packages of soap, 400 barrels of wax, 300 barrels of bark extract, 1,000 barrels of lubricating oil, 100 tons of wood, 3,000 packages of acetate of lime, 150 barrels of oxide of zinc, and 10,000 packages of cooperage stock.

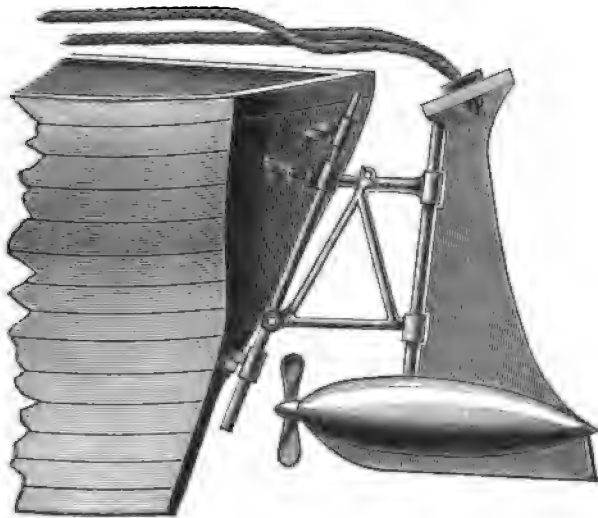


### THE ELECTRIC RUDDER-MOTOR.

THE accompanying illustration represents a form of portable electric rudder-motor, recently introduced by the New-Mayne Electric Rudder-Motor Syndicate, Limited, of Palace Chambers, Westminster, S.W., where it may be seen working.

Designed, as shown, to allow of any boat being almost instantly fitted with electric propelling gear without previously having to undergo the slightest structural alteration, this system should at once command the attention of Naval and Mercantile Marine officers, and of yachtsmen desirous of securing the many advantages of an electric launch, without having to incur the heavy outlay of purchasing such a craft, while the further advantage of being able to use the rudder-motor interchangeably with any of the boats of a ship's complement is obvious.

Briefly, the system may be said to consist of three parts. First, the motor shaped as a miniature



torpedo, and secured to the boat's rudder in such a manner that its screw shaft runs, normally, in the keel line of the boat, its movement with the rudder greatly increasing the steering power of the boat. The outer case of gun-metal, is readily taken apart, to permit of examination of the armature, commutator, brushes, &c., all of which are of special strength.

The winding is in series, and the  $\frac{1}{2}$  H.P. motor will take from 20 to 30 ampères at 24 volts. The accumulators for this size consist of 12 cells of the I.E.S. type, contained in four boxes capable of being easily stowed under the seats. These accumulators suffice for five hours' running, at five to six miles an hour, and may, of course, be re-charged from any dynamo. A regulating switch enables the motor to be reversed, or driven at any intermediate speed, ahead or astern, as required.

The current passes from the accumulator to this switch, and from thence by means of the rudder lines to the motor.

When the rudder is unshipped, the propeller may

be replaced by a pulley wheel, and the motor used for other purposes.

At present these motors are made in two sizes only, namely,  $\frac{1}{2}$  and 1 H.P. each, but special quotations will be given for larger sizes.

The advantages of being able to have a boat ready in two or three minutes for a twenty-five miles run, are too obvious to need any dilation at our hands, but we would point out that as the whole 1 H.P. outfit weighs only about 4 cwt., and its presence does not in any way interfere with the ordinary rowing of the boat, its value as an auxiliary source of power should not be overlooked.

### LAUNCH OF H.M.S. "VENUS."

ON September 5th the launch took place of H.M.S. *Venus* by the Fairfield Shipbuilding and Engineering Co., Limited. The ship is a second-class protected cruiser of the improved *Talbot* type, and represents the natural development of the class of which the *Magicienne* and *Marathon*—both, by the way, built at Fairfield—were the earliest examples. She is 350 ft. long between perpendiculars, and 54 ft. in extreme breadth, and her displacement is about 5,600 tons. Her protective deck in thickness ranges from  $1\frac{1}{2}$  in. to 3 in.; the engines are, to prevent damage by raking fire, enclosed in a citadel of Harveyised steel; and the reserve bunkers over the machinery space are subdivided into watertight compartments to as nearly as possible complete the protection of the ship's really vital part. The machinery, which was completed some time ago by Mr. Laing's staff, is of the triple-expansion type, with cylinders of 38 in., 49 in., and 74 in. diameter, and a stroke of 63 in. The I.H.P. is about 9,000. The coal capacity is 550 tons in ordinary circumstances, but a much greater quantity may be carried if a long trip at high speed is necessary. Her armament consists of five 8-in. guns, six 4.7-in. guns, and eight 12-pounder guns—all quick-firing guns—and a number of smaller machine-guns. Forward there are two torpedo tubes submerged, and aft one above the water-line. Of officers and men she will carry 450 all told.

The launch was attended by a large number of people. In the yard work was suspended for the greater part of the day. The launch was fixed for half-past one o'clock, and shortly before that time the Duchess of Montrose, who was to christen the ship, entered the reserved enclosure. Accompanying her Grace were the Duke of Montrose, Lady Pearce, Sir William G. Pearce, Bart.; Sir William Arroll, M.P.; the Right Hon. Sir William T. Marriott, Mr. Richard Barnwell, Dr. Elgar, and Mr. James Dunn. Amongst the other ladies and gentlemen on the platform were Sir James Bain and Miss Bain, Miss Barnwell, Mr. T. J. Dod, of Lloyd's, and Mrs. Dod; Mr. Robert Gourlay, Bailie T. C. Guthrie, Mr. George Heriot, of the Board of Trade, and Mrs. Heriot; Provost Kirkwood and Mrs. Kirkwood, Captain Hamilton and Mrs. Hamilton, Mr. John Hamilton, of Messrs. Robert Napier & Sons, Limited; Captain F. Le Clerc, French Naval Attaché; Mr. John List, Mr. T. R. Mackenzie, Mr. R. A. Munn and Mrs. Munn, Mr. Charles Russell, Captain Webster, Mr. John Ure, Mr. Edmund Sharer, Mr. Arthur Benton, Mr. G. Strachan, Mr. Frank W. Ker, and Mr. H. Boyd.

The religious service customary at launches of British warships was conducted by the Rev. Dr. John Macleod. The work of the squads whose duty was to displace the blocks and make the final preparations for the launch was resumed, and at about twenty minutes to two o'clock "all clear" was signalled. Her Grace the Duchess of Montrose then released and christened the ship, and after a very successful launch the vessel entered the water amidst cheers. A silver casket, containing the mallet with which her Grace tapped the electric button, was afterwards presented to the Duchess by the builders. On the mallet, which is of solid ivory and beautifully carved, are her Grace's coronet and monogram. The design of the casket is Runio. On the front of the domed lid the vessel is reproduced in relief from the original design, with underneath the inscription, "This casket, presented to the Duchess of Montrose by the Chairman and Directors of the Fairfield Shipbuilding

and Engineering Co., Limited." On the opposite side is reproduced a bird's-eye view of Fairfield, with on each side the coronet and monogram of Her Grace enclosed in neatly-twisted ropes, from which hang the Fairfield seal and at the top the Montrose Arms. The casket was designed and made by Messrs. R. Stewart, silversmiths to Her Majesty, Argyll and Buchanan Streets, Glasgow.

## THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

### The National Steamship Co.

THE rumours concerning this line, which I mentioned in my last Notes, had a very substantial foundation of fact. Before the end of August the secretary of the company issued a circular to the shareholders offering for their acceptance a scheme for the transfer of their business to a new company, called Leyland, Wilson & Furness, Limited. The circular informed the shareholders that "The choice lay between accepting this scheme and compulsory liquidation, which might involve a call being made upon the preferential shareholders in the company." Leyland, Wilson & Furness were to have a capital of a quarter of a million sterling, with power to raise debentures to the extent of a further £150,000. It was necessary for shareholders to the extent of 85 per cent. in the old concern to adhere to the new plan to carry it through, and after much correspondence in the press, two or three public meetings and a poll, the directors abandoned the scheme, as they found that over 15 per cent. of those interested were against the proposal, and that therefore there could not be the necessary 85 per cent. in its favour. Other schemes are in the air, and it therefore may be interesting to make a short review of the National Co.'s position.

The line was started in the year 1863 by a few very sharp-sighted Liverpool merchants, who appreciated that there was a good time coming when the American Civil War would be finished, and these gentlemen were desirous to be on the spot to reap their share of the advantages they foresaw. The original fleet consisted of four steamers of a size then almost unprecedented. They ranged from 3,000 to 3,500 tons gross register, which, at that time, was very large. The crack Cunarders of the day were the *Persia* and the *Scotia*, and their tonnage was 3,300 and 3,800 respectively. These pioneer National boats were, therefore, the *Georgics* of their day. For they did not profess great speed, but had large carrying capacity, and had a light draught in order to enable them to enter the ports of the Southern States. I may mention that one of the four met with her end at the very outset of the career of the company. These vessels all bore the names of States of the Union. The wisdom of the new departure was so fully justified that another fleet of four vessels of even greater size were added to the company's resources the following year. These bore names of a different character, though the national idea was certainly indicated by them. They included the *Erin*, *Helvetia*, and *The Queen*. Another year saw two larger vessels again added. These were the *Scotland* and the *England*. The former was soon lost in American waters, and for many years she was a source of litigation and expense to the company. I could not, even now, feel justified in asserting that, after nearly thirty years, her career in the American courts is over. Next year, again, a pair of ships were added, and these were followed by the *Italy*, a very remarkable ship. For she was the first vessel in the Atlantic trade to be fitted with engines on the compound principle. This fact gives us a clue to the type of man who built up the business of the National Line. Men who appreciated the advantage of big steamers for the trade, men who believed in being in the forefront of the shipping world with their machinery and ships, and were ready to adopt the latest sound improvements, but who did not make great leaps forward into the comparatively unknown.

They believed in large ships, but they made the increase in size a gradual one, that they might not get too unmanageable vessels, or vessels which might develop structural weakness or prove to be in advance of the requirements of their business. They evinced it too by adopting the compound principle, which had proved successful in other trades where economy of coal appeared more vital. In the early seventies two other ships were added, the *Egypt* and the *Spain*. These were vessels 700

tons bigger than the record-breaking *White Star* boat of their day, and over 1,000 larger than the *Parthia*, which at the time fulfilled the apparent ideal of those who directed the policy of the Cunard Line. Here, however, the development came to a stop. Bad times came upon the Atlantic trade, and the National Line's fleet stood still save that the earlier ships were lengthened and re-engined. The original capital of £750,000 was increased by the issue of eight per cent. preference shares to the amount of £125,000, the shares being of £8 each, though only £5 was called up. Time went on and a new departure was conceived. The *White Star* Company first, and the *Guion* Line after it had shown the profits to be made from fast mail boats, and the National must have a fast boat too. So they used what balance they had at the moment, called up another £2 from the preference shareholders, and started the *America* to run against the *Oregon*. She was a fast and good-looking boat, and actually got the record in one direction for her owners. But the line soon found that one flyer does not make a line. Travellers did not care to pay high figures for return tickets when, if they missed the *America*, they might have to go by the *Helvetia*, and would at best have the *Egypt*. The latter, though a fine vessel and done up for the occasion, was not fast enough for the cream of the passenger trade. So the *America* was sold and the preference shareholders got the two pounds back, and the passenger trade was given up altogether. At length, some nineteen years after they had turned out the *Egypt*, the directors came to the conclusion that they had better have a new boat or two of a type fitted to the trade which they were then carrying on. So two 5,000-ton triple boats were added to the fleet in 1890. This move seems to have come altogether too late, especially as it was not till just two years ago that it came home to them that their old crooks had better go for what they would fetch. Since this fact was appreciated it has been well acted upon, for no less than six old stagers have gone to the shipbreakers. It has also been appreciated that a great deal of money has gone for ever, and ten years ago a sum of £650,000 was carried to a depreciation account. This was eventually wiped off altogether, and some time ago the ordinary shares were written down from £10 to £1. Thus it was acknowledged that £650,000 had filtered away and the capital of the line now consists of £125,000 in preference shares and £100,000 in ordinary. The fleet which represents all this money consists of the *Greece*, the *France*, and the *England*, whose average age is thirty years, and whose tonnage amounts to 13,694 gross. Judging by what *The Queen*, the most recently sold vessel, fetched, the value of these three is £14,000. The *Spain* is only twenty-four years old, and her tonnage is 4,512 gross. Perhaps we may put her down at £8,000. Seven pounds a ton would be a very fair price for the two newer boats. So the fleet is worth under a hundred thousand pounds. The company also owns a wharf at New York, valued at some £19,000, and its good-will is another asset as long as it is not compelled to liquidate its affairs. But it is some £30,000 in debt. The new company's offer to give £30,000 in cash for the settlement of the line's indebtedness and then to give each preference shareholder half a preference and a whole ordinary share in the new company for his interest in the old. Whilst for his one pound share in the old company the ordinary shareholder would receive a quarter of a one-pound share in the new. It seemed to me, on the facts that I have stated, that the offer was a good one for the ordinary shareholder. He had apparently lost everything, and five shillings in scrip is better than nothing. But he did not see the matter in that light. He thought that what Leyland, Wilson & Furness could do could be done by him, and that if he could make the preference shareholders pay up their balances he might yet get a new fleet and make a fresh start himself. The Allan Line, too, have made an offer which I may discuss later on. But the story shows that shipowning, save under favourable circumstances and with the best management, is a very disastrous game. It was trying to work with old-fashioned boats that did the mischief, and if the lesson is not taken to heart we shall hear of still greater catastrophes affecting some of the most famous lines.

### An old White Star Boat.

When I am dealing with this matter of the National Line I may refer to the remarks of the chairman of the line as to the *Runic* and her sister the *Cujic*. What he said has been very largely quoted, as showing how quickly the cargo steamer goes out of date. Speaking of his line's steamers *America* and *Europe*,

built in 1890, the chairman of this ill-fated concern said, "that the *Cufic* and *Runic*, when they came round here just before our new ships, were looked upon as the beau ideal of cargo ships, but where are they now? They are laid up unable to sail in competition with the ships that have more recently been constructed." He spoke also of "the ships of five years ago as for most trades obsolete." Now although the *Cufic* and the *Runic* were undoubtedly lying up at the time he spoke I hardly think they could have been considered "obsolete for most trades." The class of business that the White Star cargo boats carry on is of the highest possible class. The great fares that are paid for the "saloon cattle" are a consideration in the earnings of these vessels. These fortunate animals are like fastidious human passengers. They like an evenly-balanced fleet, so that there is no chance of the turn they want to take being filled by a single screw boat such as the *Runic* or the *Cufic*. These vessels are obsolete to the extent that they have single screws, and being smaller, are not quite as economically worked as the latest of their sisters. But obsolete is a strong word. The *Georgic*, if full, conveys cargo more cheaply than her recent predecessor the *Cevic*. Is the latter then obsolete? If so, every ship is obsolete but that most recently turned out. The *Runic's* character has been vindicated by the West India and Pacific Steamship Co., who have considered her worth something over £7 a ton, and that at a time when an experienced valuer of shipping tells us that new steel cargo boats to class 100 A1 at Lloyd's with full outfit and every modern improvement, can be bought under £6 a ton.

#### A Big Steamer.

Judged on this chairman's standard the *Georgic* herself will be obsolete in a few months, for the Hamburg-American Co. has ordered a 20,000-ton cargo boat from the great Queen's Island yard. This vessel will, however, not be a pure cargo boat, for like the vessels recently added to the Hamburg Co.'s fleet, she will carry a limited number of passengers.

#### The Belgian Mails

are adding a new steamer to their list of big fast paddle-boats. The *Rapide* is one of those which were turned out by the Cockerill Co. She was, however, tried on the Clyde so as to give every facility for the comparison of her performance with that of the sisters built at Dumbarton. It appears that the *Rapide*, on this official trial, did 20·834 knots. A press cruise was given on board of her on the 31st August in the British Channel, off Dover, and methods were employed for the purpose of giving her an apparent superiority in speed over British ships, which I hope will not recommend themselves to any builders or engineers from this side of the Channel. No less respectable an organ than the *Times* said, in its account of this affair, that "the *Rapide* figured successfully in two exciting races which took place in the English Channel on Saturday, beating first H.M.S. *Magnificent*, one of the fastest battleships in Her Majesty's Navy, and subsequently the Margate and Boulogne steamer *La Marguerite*, which has the reputation of being the "greyhound of the Thames." An account is then given of the alleged races, in which it appears that the *Rapide* slipped out of port after each of these two ships when they were bound on their own business, and having, as the correspondents allege, passed them, she claims to have beaten them in speed. Even the circumstances under which the cruise took place should not have made the *Times* representative oblivious to the fact that the speed of battleships and of cross-channel mail boats are not likely to be similar. Speed is undoubtedly of importance in all warships, but battleships have to do very many other things beside fly. Mail steamers have nothing else to consider but speed, and that, in the case of a cross-channel boat like the *Rapide*, only for short bursts. The *Magnificent* is designed for a speed of 17·5 knots—a very great speed for any battleship. She has attained it. The *Rapide* is designed to beat her earlier sister *Marie Henriette*, a vessel whose speed is given at Lloyd's as exceeding 19 knots. I believe she is claimed by her people as being, in fact, a 20-knot boat. What credit can a 20-knot boat claim in beating, if she did beat, a vessel whose designed speed is 2½ knots lower? As well might she claim credit for the defeat of every 10-knot collier she ran past. The race with the *La Marguerite* is on a different footing. It is not certain by any means that she did beat her at all. If she did the fact would be no proof that the *Rapide* was the faster ship. The Belgian was out in racing trim to show her paces, the British ship was on her ordinary work with many valuable

lives on board. She was not thinking of racing at all, but was going on her way and regarding the objects of her trip, and the length of her journey. Liverpool Bar is dead and gone, but suppose for an instant it were not. If a few years ago a cruising steam yacht drawing little water were on trial in St. George's Channel, and had fallen in with the greyhound of the day, which knew it had just missed the tide and was going slow. If the yacht, doing all she knew, passed the greyhound, could anybody suppose that the meeting would have been a proof that the little vessel had the superiority in speed? The answer would be, Why, the conditions were manifestly unfair. So do we answer the claim of the *Rapide*. We do not know whether the captain of the excursion boat was pressing his steamer. We do not know if she was in tip-top condition. We do know that what the *Times* calls the "challenger" was in both perfect condition and going as hard as she could, or she would have avoided the race all she knew.

#### Canadian Mails.

The proposed Imperial Steam Navigation Co. (or whatever was the name of the concern with which Messrs. Huddart & Co. wished to be associated on the Atlantic), seems to be dead and gone before it was born. I have heard nothing of it for a long time. The need for a decent company to carry the Canadian mails is however as great as it ever was. The *Labrador* has just made a boast of her recent breaking of her own record with the Anglo-Canadian mails.

For a boat of the *Labrador's* age to break her own record is a great thing, and it shows her a well-built boat and one that has been well kept up. It does not, however, show that she is fit to carry mails between England and her nearest colony. When we regard the absolute speed attained and find it somewhere in the neighbourhood of 15 knots we must admit that it is a speed which is a disgrace to this country. Vessels averaging on record passages no less than 22 knots are in the trade to the United States, and we cannot expect Canada to take her rightful place when she is so badly served with means of communication with Europe. If those who talked so much of a 20-knot service cannot give us one it is time that some who can, came forward, and took their place, and the place of those who have kept Canada twenty years behind New York.

#### A Record.

Speaking of fast steaming, I must not forget to give credit to the Cunard steamer *Aleppo*, which has just made a record when thirty years old. She has brought the first of the new crop of currants home from the Grecian Islands in the fastest time ever recorded, 9 days 21 hours and 30 minutes.

This vessel has had the advantage of triple-expansion engines comparatively recently. We need not, therefore, be entirely unprepared for a tremendous outburst of speed. Still, when I add the information that, taking the distance from Patras to Liverpool at 2,700 miles, the speed works out at something over 11 and under 12 knots, there seems little cause for pride in such a performance when we are within five years of the end of the nineteenth century. It, however, looked well in the papers, where the distance steamed was not given.

#### Southampton Docks.

The beginning of September saw the completion of the new quay on the Solent side of the entrance to the Empress Dock. It is known as the Itchen Quay, and is the place where the Prince of Wales landed from the Royal Yacht when he came to open the new graving dock in August. Here, in future, the North German Lloyd steamers will embark and disembark their passengers without the use of tenders. As there are railway lines on this quay it will in future be possible for passengers to step from train to steamer when travelling by the North German boats as well as by the American steamers.

#### The "St. Louis"

did a four hours' run in the British Channel on the 19th of August, when her mean speed for four hours was calculated at 22·3 knots. She is certainly improving in speed. As far as I know the best day's steaming to the westward—which I think is a good test for speed—made by crack boats is as follows:—

<i>Campania</i> or <i>Lucania</i> ..	560	nautical miles
<i>Paris</i> or <i>New York</i> ..	531	" "
<i>Teutonic</i> or <i>Majestic</i> ..	523	" "
<i>St. Louis</i> ..	519	" "

The New Cardiff-New York Steamship Line has formulated its scheme. This is so humble as hardly to

bring it within the purview of the "Mail Lines." Nevertheless, modesty in beginning is a very laudable thing and is more likely to insure eventual success than too large ideas. The Cardiff-American Steamship Co., as the new venture calls itself, is to start with three ten-knot cargo boats of from 3,500 to 4,000 tons each. Its capital will only be £40,000. Nevertheless, as it will not have an expensive fleet to keep up or great capital charges to meet it may pave the way to a great success.

#### The Daily Press and the Fleets of the Mail Lines.

It is perhaps rather superfluous to laugh at the *Standard*. Still, as the *Pall Mall Gazette* thinks it worth while to point out one ignorant error in geography, I may be excused for dwelling on another in regard to steamships. The *Pall Mall*'s find was this. The *Standard* wished to say that a certain gentleman had explored the Niger from "Say to Timbuctoo." "Say," unknown to the *Standard* authorities, being a town. They printed the information, "Captain Toutee completely succeeded in his task, which was to explore the Niger above, say, as far as Timbuctoo." In giving its information regarding the hired Indian transports, when the P. & O. *Britannia* sailed as No. 2, at mid-September, it spoke of another hired ship of the service as "the BI transport *Delaware*." Who would have thought that the simple abbreviation of the British Indian Steam Navigation Co. to B.I.S.N. Co. would have led to such disaster? B.I. is not a class for ships in a register, but means British India, and the ship's name is not *Delaware* but *Dilhara*.

The *Britannia*, which I just mentioned, is again in service along with her old companion *Victoria*, from the P. & O. fleet, whilst the *Pavonia*, of the Cunard Line, rather a favourite trooper, is again serving Her Majesty. The *Pavonia*'s late commander, by the way, is reported to have just received a Board of Trade appointment at Dundee. Talking of mistakes, I must not forget that of the *Southampton Times*, which, on the 21st September, described the new P. & O. steamer *Palawan* as "the fourth steamer built by Messrs. Caird for the company." This obviously erroneous information prompted me to look up what they had really done for the big line. I see that the *Palawan* is the third vessel they have launched for these owners this year. In 1894, they also built them three steamers. In 1893, they only turned them out one. But the number was four in 1892. There were none between 1889 and 1892. But in the earlier year again the number was four. In 1888 and 1887 the number was two each. So it was in 1885, which was the year that the P. & O. Co. took to the triple-expansion type of engine. This makes a total of 21 triple-expansion steamers turned out for them by this one firm alone in 10 years. I make the gross tonnage of these boats to amount to upwards of 100,000 tons. This alone would be a prodigious tonnage for the P. & O. to have acquired in a decade, but it must be remembered that Harland & Wolff and the Barrow Co. have turned out various important vessels also during the same period, whilst Palmer's, Stephens, and Raylton Dixon have also executed orders from them. In the days previous to the introduction of the triple-expansion type of engine the business passing between Caird and Co. and the P. & O. was quite as large in proportion, and I should be very sorry to make an attempt at giving the number and tonnage of all the ships they have provided for the great line of Leadenhall Street.

#### Disasters.

The docking of the United States warship *Columbia* at Southampton, previous to the run I mentioned last month, has proved a disaster for the captain. He was tried by court martial on his return from this country to his own, and sentenced to a suspension of six months for not exercising proper supervision over the arrangements made by the dock officials. This, it may be said, is not a matter to come within the scope of these Notes. But the Southampton Docks are so thoroughly associated with the Fleets of the Mail Lines that any trouble that may occur in connection therewith is bound to interest my readers. We can hardly suppose that the last has been heard of the matter with the suspension of the ship's captain, and I therefore postpone my comments.

The loss of life on board the Edinburgh and London Steamship Co.'s s.s. *Iona* was a very unfortunate matter, and the authorities being still in consideration of the evidence as to the causes of the fire, my remarks on the matter must be most guarded. Three possible causes for the outbreak have already been suggested. An accident in the lamp-room was the first, but

there is also talk of the possibility of the fire having arisen from the pipes of the male passengers on the one side of the second class saloon, or of the spirit lamps of the female passengers on the other. What, if any evidence, there may be in support of any of these theories I do not know, and if I did I should not now discuss the matter. I cannot, however, refrain from deprecating the action of the jury, who at the very outset of the inquiry made assumptions that the lamp-room was the cause of the fire, and had apparently made up their minds as to the recommendations they would add to their verdict. It may be hard not to form some opinion beforehand as to the cause of an accident so much discussed as this was. Yet it was most improper to show that an opinion was already formed. Jurymen are only human, but they should keep an open mind and not play to the gallery. The applause which followed the remark was most indecent.

The foundering of the Dutch mail steamer off Plymouth, was not matter of great surprise. Collisions will occur in fog until new methods of communications are discovered and the proximity of vessels shown by other and clearer means than fog whistles. That the vessel sank when struck need astonish no one who remembers that she was hit on the broadside amidships by a vessel double her size. Whether bulkhead arrangements were, is not clear from Lloyd's particulars. The foreign information gives her seven bulkheads, which is as many as vessels of her size and age generally have. But if two of her midship compartments were holed there was little likelihood of her keeping afloat for long.

The *Seaford* matter, however, has its lessons. The general public might take some trouble to understand matters pertaining to the sea before they write about them. Take, for example, the letter of a Mr. Rogers, B.A., who was on board at the time of the disaster and wrote to give some details. He closed his letter by a turn on the bulkhead question. He had heard, it appears, that the *Lynn* which struck his ship floated because her collision bulkhead held. She was only a cargo steamer. He complained therefore in vigorous language because the *Seaford*, a passenger boat, and therefore, as he said, a *fortiori* with a more valuable burden, had not such bulkheads to keep her afloat too. He felt that collision bulkheads should be fitted to all passenger steamers and then there would be no repetitions of the *Seaford* disaster. Could a better instance of landlubber's ignorance on things nautical be desired? Here is an educated man making a demand for legislation when he is hopelessly ignorant of what he is talking about. He does not see what a collision bulkhead means, nor realise that the *Seaford* had one, and that its strength was never tested on this, to her, fatal occasion. Yet it is in response to such empty cries that shipping legislation is brought forward, and through it ship-owners lose their money in competition with the foreigner, whilst shipbuilders find their clients too poor to give them orders, and marine engineers find themselves paid off without prospect of getting again afloat.

That there was room for improvement in the *Seaford*'s bulkhead arrangements may be theoretically possible, though it may not have been so commercially. Coal bunkers between the big compartments might avoid the possibility of the flooding of two by any one blow. The ill-fated warship *Victoria* taught us, as did the *Oregon* in the Merchant Service, that bulkheads should not have doors below the water-line. But legislation is hardly wanted. There must be some risk at sea, and passenger lines lose so much by the injury to their reputation for safety, that no insurance money will compensate them for a loss. They will, therefore, neglect, for their own sakes, no reasonable precautions, and the authorities cannot insist on precautions beyond what are reasonable.

**City of London College.**—We are desired to remind our readers that the Michaelmas term of the forty-eighth session, 1895-96, commenced on September 30th and closes December 21st. From the syllabus sent us, engineering subjects evidently form a strong point in the College programme, this department being under Professor Henry Adams, M.I.C.E., M.I.M.E., etc., the author of several valuable text books. We notice that the College has now 40 professors and lecturers upon its staff engaged in giving instruction in upwards of 50 different subjects, divided into 130 classes, and that the average attendances for a session of about eight months, reaches the large total of 70,000. There are day and evening classes and the fees are in all cases very moderate. The College is within two minutes of Moorgate Street Station.

### THE AMERICAN LINER "ST. LOUIS."

IN accordance with our promise in our last issue, we supplement the details of this magnificent liner by illustrations of the four deck plans from main deck to the highest promenade deck. Above this latter is only the shade or awning deck, reserved exclusively for the captain and navigating officers, so that they may be secluded from every distraction in working the ship, and where the captain and officers have their state-rooms and a commodious mess-room besides. Here is also the bridge, equipped with telegraphs for communication with the engine-room and all other parts of the ship. The boats, 34 in number, also are stowed out of the way of the passengers on this awning deck so as to leave the promenade deck free for walking exercise or for sitting about at refreshment or lunch tables. The adjoining first and second-class smoking saloons and ladies' drawing-room afford most luxurious comfort and shelter when the weather is too cold or inclement for the open air. A most excellent arrangement, also on this upper promenade deck, is a special pantry and service of stewards for open-air refreshments, luncheons, and dinners. All saloons are especially ventilated by currents of fresh air driven into every compartment, and the vitiated air is withdrawn by exhaust.

On the next deck below, termed the saloon deck, we find a palatial dining saloon, seating 350 persons, lit by electric light and most luxuriously furnished and decorated. A second-class dining saloon, nothing lacking in comfort and but little less luxurious than the first-class saloon, is also on this deck, and also a library, lavishly equipped as to furniture and books as any club library in the world. The upper and main decks are devoted to state-rooms, of which there are also a good number, which are likely to be most eagerly sought for, on the promenade deck. The vessel, with its four decks above the main deck, is a towering structure, almost like a modern hotel, and the luxury and convenience of the appointments and service, render it in every way equal in accommodation to such a first-class hotel.

### INSTITUTE OF MARINE ENGINEERS.

THE first meeting of the Institute of Marine Engineers for the session 1895-96, was held on Monday evening, September 23rd, at the Institute premises, 58, Romford Road, Stratford, when the President (Mr. A. J. Durston, C.B.), delivered his inaugural address. There was a large attendance of members, among those present being Mr. G. W. Mannel, R.N.R. (past-president), Mr. J. McFarlane Gray, Mr. Archibald Thomson, Mr. J. D. Churchill, Mr. R. Leslie (hon. treasurer), Mr. Alderman Kidd, Mr. W. H. Northcott, Mr. A. W. Robertson, Mr. D. Bielloch, Mr. F. W. Shorey, Mr. A. Campbell, Mr. W. White, Mr. C. L. E. Melsom, Mr. J. B. Johnston, Mr. G. Wiltshire, Mr. J. R. Ruthven, Mr. T. F. Aukland, Mr. P. Searth, Mr. W. G. Neal, Mr. James Adamson (honorary secretary), &c.

Mr. Adamson, on behalf of the members assembled, welcomed Mr. Durston to the Institute, and

The President then proceeded to deliver his inaugural address. He said:—

Gentlemen,—When the Committee of the Institute of Marine Engineers honoured me by asking me to undertake the office of President for a year, I accepted with some diffidence as I knew that I should necessarily compare unfavourably with distinguished past-presidents. As Engineer-in-Chief of the Royal Navy, I had, however, a sincere desire to foster as much as lay

in my power a feeling of cordial relationship between the engineering branches of the Royal Navy and the Mercantile Marine, and I felt a sense of duty that compelled me to accept with gratitude an office offered with so much courtesy. I may, perhaps, add, that having been a repeated recipient of the hospitality of the Institute, I had been enabled to observe that the cares and responsibilities of office did not appear to press too heavily on the gentlemen who so worthily filled the presidential chair. In addressing you to-night, I have to tell you that my duties have been altogether light and pleasant, and I have to congratulate the members on the continued prosperity of the Institute—both as regards the parent establishment, and the flourishing foreign and provincial centres. The papers read and the discussions thereon have fully maintained the high standard set up at the earlier meetings of the Institute. This, I may say, is a matter of the first importance in connection with this Institute. A good paper is not one that necessarily involves much scientific investigation in its preparation. The intelligent observations of a competent sea-going engineer on the working of the machinery in his charge, may when read and criticised by other men equally familiar with their subject, call attention to facts highly valuable to the designer and builder of machinery. Speaking as a designer of marine engines for the Royal Navy, I can assure you, gentlemen, that the information contained in the reports from commanding and engineer officers serving afloat is very much appreciated, and we avail ourselves at the Admiralty of information obtained from this and similar practical sources to the fullest possible extent.

This Institute also induces and promotes social intercourse, and it provides for the healthful and rational recreation of its Members; these are very desirable objects; but it is on its published Transactions that its professional status must ultimately rest, and I therefore appeal to every member to do his utmost to assist the Committee in placing good readable papers before the meetings.

We are now possibly on the eve of important departures from present practice in marine engineering, and you are aware from the discussion of the subject in the House of Commons that several vessels in the Royal Navy, have been, or are being fitted with water-tube boilers. The general question of the use of higher steam pressures which necessarily involve, in my opinion, the use of water-tube boilers, will be of interest to all members, and if it be shown by experience that increased pressures can be obtained with water-tube boilers with safety and efficiency, and that a considerable gain in economy results from the use of such high pressures, no doubt the Mercantile Marine will be forced by competition to their adoption, assuming of course that any practical difficulties are shown by experience to be overcome when proper appliances are fitted. One very important reason for the adoption of very high pressures exists in the Navy, however, to a much larger extent than in the Mercantile Marine, and follows from the fact that Naval machinery, although possessing the capability of exerting great power, the usual powers exerted on service of the naval ship is but a small proportion of the full power. It is well known that such small powers cannot be developed in a large engine with economy, and one advantage of the provision of very high pressures for the maximum power lies in the reduced size of engine which results, and which will have a beneficial effect in making the engine more economical at those low cruising powers which the vessel exerts during most of her life. Besides this special advantage which accrues in the Navy, there is of course the general advantage of lightness. There are certain types of war vessels where the development of the highest possible power for short spurts is of paramount importance, and this highest possible power is required on the lowest possible weight of machinery. I need hardly mention in this assembly that increased steam pressures and piston speeds follow as a natural consequence, and for this special type of vessel water-tube boilers are essential. As examples of this type of vessel, the new torpedo-boat destroyers, where speeds of 27 to 30 knots are required, may be mentioned. I mention the subject in connection with the Institute, as it is possible that the water-tube boiler may be fitted, to some extent, in the Mercantile Marine, and that the design, construction, and working of water-tube boilers will, in the near future, occupy the attention of many of the members of the Institute. The meetings will offer convenient opportunities for discussion and interchange of opinion, and the transactions will circulate



the information obtained among members abroad, or at home, who may be unable to attend the reading and discussion of papers.

I imagine the members do not desire to be troubled with any information involving great technical detail, but there are a few other remarks I will make of a general character on subjects which all members of the Institution are interested in. These refer to practice in the Navy and Navy experience, and may be of use to members of the Mercantile Marine in dealing with their own problems. First, regarding the important question of leaky tubes in boilers, and experiments on the approximate temperature at which this occurrence takes place. Some experiments were made at Devonport Dockyard, in order to throw light on this, and also to ascertain the temperatures which were actually produced under practical conditions. The results of a preliminary series of experiments were given in a paper read before the Institute of Naval architects in March, 1893, and some of the leading points contained in that paper are, shortly, as follows:—First, tubes remained tight in a tube plate up to a temperature of about 750 deg. Fahr., but leakage must be expected when this temperature is much exceeded. Secondly, as regards the temperatures which were attained under different conditions of working, it was found that with boiling water under atmospheric pressure in a plain vessel, the temperature on hot side of plate was only 280 deg. with clean fresh water, but rose to above 550 deg. when the vessel was coated internally with a layer of grease 1-16th in. thick. The effect with boiling water under pressure was obtained by experimenting with a small boiler. This boiler, consisting of a cylindrical shell with tubes and a brickwork furnace at one end, was worked with a steam pressure of 145 lbs., air pressure, 3 in., the rate of evaporation being about 12 lbs. of water per square foot of heating surface per hour. Two trials, each of about five hours' duration showed a temperature on fire side of tube plate of about 750 deg.; at a third trial a small percentage of oil (.07 of feed) was introduced into the boiler and the temperature rose to between 750 deg. and 1,060 deg. on the fire side; at the fourth trial a small additional percentage of oil (.05) was introduced, and this caused the tubes to leak; the temperature became about 1,060 deg. on the fire side, and between 680 and 750 deg. at the centre of the tube plates, thickness representing the mean temperature.

The experiments were conclusive in showing the importance of keeping the water side of the heating surface free from greasy deposit, and the water free from grease, and only confirms what is now well established in practice. To attain this end as nearly as possible, feed-water filters are now commonly adopted in H.M. ships, and also every effort is made to reduce the quantity of oil used for lubricating internal parts of engines to a minimum. As a means of preventing an excessive tube plate temperature near the tube jointings, the cap ferrule was introduced, a fitting which was fully described in the paper above referred to; and it only remains to add that, up to the present, experience has shown that this fitting has been very beneficial in preventing leaky tubes, and that the ferrule deteriorates but slowly on service.

The Devonport experiments were continued after those described in the paper of March, 1893, with the object of obtaining fuller information on the distribution of temperature over the tube plates and tubes. The result of one of these trials may be given. The boiler was worked with the steam pressure at 145 lbs. per square inch, and air pressure at 3 in., and the resulting temperatures of the fire-box tube plate, were, on the water side, 400 deg., middle of plate, 617 deg., fire side of plate, 750 deg. to 1,060 deg.; the temperatures of the tubes themselves were, on the fire side, 680 deg. F. at the fire box end, 617 deg., middle of length, and below, 480 deg. at smoke box end.

During the series of experiments, which have been made at Devonport, several other points were investigated and some conclusions indicated, among which the following may be worth noting. Brass and copper tubes are more liable to leakage than those of iron or steel. Tubes of Lowmoor iron are as liable to leak as steel tubes. The loss of efficiency, arising from a thin coating of grease deposit was a substantial amount, averaging 11 per cent.

An occurrence in one of the new torpedo-boat destroyers may also be mentioned as confirming the view, that when the temperature is raised beyond 750 deg., i.e., about the temperature of melting zinc, leakage of tubes will occur. The vessel in question is fitted with four boilers arranged in two stokeholds—two boilers in each; one main feed pump, and one auxiliary feed pump being provided for each pair of boilers.

During a full-speed run, a defective tube burst in the forward boiler, but this fact was not immediately recognised by those in the stokehold; the water disappeared from the gauge glass, and in the endeavours to maintain the usual water level in this damaged boiler, the water became so low in the other boiler that the tubes were seriously overheated. Some idea of the temperature reached can be obtained from the fact that the solder securing the ends of the wire on the main steam pipes, and a zinc slab in the steam collector of the boiler, were melted, so that the temperature of steam had been above 750 deg. Fahrenheit.

When the accident was realised, the defective boiler was shut off, and water pumped into the over-heated boiler; the tubes of this latter leaked considerably at the steam collector joints, and required subsequent re-rolling throughout, but no other repair. This incident took place in a water-tube boiler where the generating tubes enter the top collecting chamber below the normal water line: but a still more recent case of shortness of water and consequent over-heating, has occurred in a boiler where the generating tubes all enter above the water line, and in this case also, tube leakage resulted, so that in every case the same result may be expected to occur if the critical temperature is reached.

It is satisfactory to note that in the case of the tube bursting, the safety appliances, viz., automatic ash pit doors and automatic stop valves, on the boiler where the tube burst, acted efficiently, and no injury of any kind occurred. Indeed, those in the stokehold first ascertained what had taken place from enquiries made by those on deck.

Experiments have also been made with a view of ascertaining the steam pressure required to actually burst sound boiler tubes of small diameter, and the results obtained are of interest. A copper tube, one inch external diameter and 15 B.W.G. (.070 in.) in thickness was taken from a torpedo-boat destroyer that had been steamed under forced draught at the full power to a large extent, partly filled with water, and the ends closed. It was placed on a smith's forge, inclined at an angle of about 20 deg. to the horizontal, and a pressure gauge fitted at upper end. On being heated, the pressure rose to 200 lbs. and the blast was applied. The pressure rapidly increased to about 1,500 lbs., then rose to about 2,000 lbs.: the tube bursting 6½ minutes after pressure was first shown on the gauge. The bursting pressure was not definitely noted, as the limit of the pressure gauge was exceeded, but, as far as could be judged, only to a slight extent. The tube had apparently burst at the bottom next the fire; but the whole portion that was subjected to heat was split open and practically flattened. Taking the bursting pressure at 2,000 lbs., this would correspond to a stress of about 14,700 lbs., or 6.55 tons per square inch. By calculation, the temperature of the steam would probably be about 640 deg. Fahrenheit. A similar experiment was made with a new steel tube intended for a torpedo-boat destroyer boiler. This tube was 1½ in. external diameter, and 12 L.S.G. (.104 in.) thick, and had been coiled cold into a spiral of about 6 in. diameter. This tube, which was half-filled with water, burst at a pressure of 4,783 lbs. per square inch, i.e., 42½ cwt., in which gauge was graduated; in this case the tube separating and only flattening out locally. This pressure corresponds to a stress of about 28,800 lbs., or 12.85 tons per square inch. The temperature of steam in this instance would probably be about 800 deg. Fahrenheit. Although it was endeavoured to approach the circumstances of actual working, it must be borne in mind that in these experiments the tubes were partially filled with water and only slightly inclined to the horizontal, whereas in water-tube boilers where such small tubes are used, the tubes are generally more nearly inclined to the vertical; and in all cases, there is a stream of water, or water and steam, passing through the tubes when generating steam.

Coming now to another question, respecting which every member of this Institution will have some data obtained from his own experience. I refer to the proportions of boilers for the powers to be developed. There appears to be still a great deal of misapprehension in some quarters as to the proportions adopted in the Navy, and it may be desirable if I explain what this practice is. For the ordinary tank boiler, the size of boiler fitted is such that 1 H.P. is developed from each 2½ square ft. of total heating surface on an 8 hours' trial, termed the natural draught trial. For a shorter trial of four hours' duration, called the forced draught trial, this power is increased by 20 to 25 per cent., so that for this short period, the heating surface is at least 2 square feet per I.H.P. On actual service, the minimum which it

is insisted must be developed by the engines and boilers continuously for as long as the coal will last in the vessel, is 60 per cent. of the natural draught power, so that at this minimum power, it will be seen that the heating surface is about 4 square feet per I.H.P. This continuous power is clearly that which corresponds to the sea-going powers of the Mercantile Marine. Although the Admiralty lay down this minimum power, there is no limitation of the amount obtained up to the full natural draught power, and on trials made expressly to ascertain the amount of power which can be continuously maintained, the minimum of 60 per

soon now be obtained. There is another subject, gentlemen, on which I may be permitted to offer a few remarks as illustrating the connection between the Royal and Mercantile Navies. Many members of this Institute are Naval Reserve officers, and are therefore interested in the requirements of the Royal Navy. We have, at present, about 200 engineers of the Mercantile Marine enrolled as Royal Naval Reserve engineers, and the opinion has been often expressed that a certain proportion of these gentlemen should be given an opportunity of joining the Royal Navy for a limited period of training, in order to become familiar with

#### TRIAL AT MAXIMUM CONTINUOUS POWER.

Ship.	Type.	Load on Safety Valve. Lbs. per sq. in.	Duration of Trial in hours.	I.H.P.	Heating Surface. Sq. ft.	Heating Surface per I.H.P. Sq. ft.	Coal per I.H.P. per hour. Lbs.	Full N.D. Power.
Royal Sovereign ...	Vert. Triple.	155	73	8,180	20,034	2.44	1.84	9,000
Royal Arthur ...	Vert. Triple.	155	72	8,821	24,828	2.81	1.85	10,000
Sans Pareil ...	Vert. Triple.	135	50	7,051	19,990	2.83	2.23	7,500
Sirius ...	Vert. Triple.	155	64	4,555	15,918	3.49	2.03	7,000
Pallas ...	Vert. Triple.	155	73	3,820	11,109	3.06	—	4,500
Resolution ...	Vert. Triple.	155	48	8,085	21,178	2.61	2.1	9,000
Cossack ...	Hor. Compound.	130	48	1,435	6,836	4.76	2.51	2,200
Mohawk ...	Hor. Compound.	130	48	1,998	6,836	3.43	2.7	2,200
Fearless ...	Hor. Compound.	120	48	1,888	6,439	3.41	2.46	2,100
Spartan ...	Vert. Triple.	155	72	6,777	15,918	2.34	1.98	7,000
Bonaventure ...	Vert. Triple.	155	72	7,083	15,600	2.2	1.76	7,000
Partridge ...	Hor. Triple.	145	48	719	2,087	2.9	2.1	700
Vulcan ...	Vert. Triple.	155	48	7,236	15,868	2.19	1.86	7,200
Buzzard ...	Hor. Triple.	140	48	1,232	3,892	3.1	2.4	1,400

cent is generally considerably exceeded. The table exhibited shows the results of a series of fourteen trials, and by inspecting the column, No. 7, showing the heating surface for power actually developed, it will be seen that the Royal Navy and Mercantile Marine practice on this question is much the same.

No doubt members will have seen much discussion respecting the merits and demerits of what is known as the induced draught system of increasing the rate of combustion in boilers. Induced draught was first tried in the Navy afloat on H.M.S. *Vesuvius*, in 1875. In her case a six foot fan running 570 revolutions was used in connection with a boiler having 42 square feet of grate surface producing about the same draught as an ordinary chimney. In this ship was also tried the effect of discharging the gases through a horizontal chimney with the outlet astern. Mr. Martin, who deserves credit for his persistent advocacy, and has largely associated himself with this method of increasing the rate of combustion, made some further experiments with the system, and showed that a considerable draught could be obtained with it. In 1889 it was decided by the Admiralty to make a comparative set of experiments with a boiler fitted with this system of draught, and subsequently with Navy forced draught, and a locomotive boiler at Portsmouth was selected for the purpose. Grate surface, 20 square feet; tube surface, 1,000 square feet. The results of these trials showed:—

(a) That with fans used to produce the induced draught, there was no difficulty in obtaining high rates of combustion. (b) That as compared with forced draught there was an appreciable gain in evaporative efficiency. (c) Moreover, the open stokehold, if properly ventilated, has advantages in comparison with the closed stokehold. It was, therefore, decided to proceed further with the system, and try it on board a ship, and for this purpose, H.M.S. *Gossamer* was selected, one of her boiler-rooms being fitted with induced draught, the other retaining the forced draught system. An extensive series of trials was carried out in that ship, the net result of which was to show that while on other grounds there was little to choose between the two systems, the great convenience and comfort due to the conditions involved in working with an open stokehold in lieu of a closed stokehold was very valuable. In view of these results further practical adaptations of the system have been made. H.M.S. *Torch*, a gunboat, has been fitted on this plan—(grate, 88.5 square feet; tubes, 2,520 square feet),—and still later H.M.S. *Magnificent*, a first-class battleship,—(grate, 820 square feet; tubes, 21,400 square feet),—and both these vessels have passed satisfactorily through their trials, and extended experience of the actual working of the arrangements at sea will

the discipline of the engine department of a ship of war, and to acquire a knowledge of what may be termed extra professional duties, such as those in connection with locomotive torpedoes and hydraulic gun machinery. It has hitherto been held that engineers in the Mercantile Marine are employed on much the same duties as those they perform if called upon to serve in the Royal Navy, and that consequently no additional training is required, but this is a question that necessarily requires careful consideration. Although a naval training is not required to the same extent in the case of a reserve engineer officer as in the case of the reserve executive officer, yet to enable the reserve engineer to undertake the duties and responsibilities involved in the charge of the engineer's department of a warship, some previous service in the Royal Navy would be of the greatest possible advantage. If a certain proportion of the reserve engineer officers were given the opportunity of serving for a period in the engine-room of a man-of-war, and were afterwards paid the same retainer as in the case of executive reserve officers of corresponding rank, it would in my opinion tend to promote a feeling of patriotism and content on the part of the Royal Naval Reserve engineer; and as it would also afford an opportunity of the Naval engineer becoming acquainted with his brother of the Mercantile Marine, it would also promote a very desirable feeling of good fellowship. I cannot, in view of the official post I hold, discuss this matter very freely, but having observed that some prominence has been given to it of late, and notably so in a paper read before the Royal United Service Institution on May 10th, 1895, by Commander Caborne, R.N.R., I have ventured to express my personal opinion on the desirability of affording engineer officers of the Royal Naval Reserve an opportunity of becoming acquainted with the routine work and discipline of a man-of-war in time of peace, in order that they may be prepared to at once accept onerous and responsible duties if called upon to serve in the Royal Navy in time of war or sudden emergency.

Finally, I would say to our younger members, do whatever you have to do, to the best of your ability. Do not be discouraged because what you may be doing at the present moment appears unimportant and your ambitions do not appear to be realised; but persevere in giving of your best to all your work, and in the end you will find that all reasonable ambitions are satisfied, and if you do not become one of the apparently exceptionally fortunate ones, you will have won your own self-esteem and that of your fellow men, and there can be no higher award.

Mr. G. W. Manuel said it was his pleasing duty to propose a

hearty vote of thanks to their President for his very able address, and he was sure they must all feel that they had in Mr. Durston one of the most able men who could fill the office of President of this Institution. Mr. Durston came to them with a very full knowledge of all the most modern practice in marine engineering, which a great many of them knew very little about, but they desired to learn all they possibly could on the subject. They could not have a better teacher than their present President, and a teacher with the experience of Mr. Durston was one whom they could look up to, because his knowledge was the result of practice and actual trials. In his address he had invited them to study the matter, and they could not have a better opportunity than under their new President. He (Mr. Manuel) hoped that when the members did take up this question of water-tube boilers their President would be able to assist them, because in the Mercantile Marine they had done very little in this respect, and as yet it had not been with very favourable results. The Navy, however, had gone in very largely for boilers of this type, and there was no doubt that before a tubulose boiler was put on board one of her Majesty's ships the case was well thought out. He thought that the study of this subject should be their great object this session. Let them go into the matter thoroughly—he hoped with Mr. Durston's assistance. Thrash it out individually for themselves, and at the end of the session he thought they would be wiser and better men. He was very pleased at the desire expressed by Mr. Durston to bring about a closer connection between the work and training required for the engineers of the Navy and that of the merchant service. Nothing could have given him greater pleasure than the manner in which in this connection Mr. Durston had held forth the right hand of fellowship, to be met in a proper spirit and a proper feeling. They might be very good engineers in the merchant service, but in the Navy there were many varieties of machinery and boilers which had been adapted, and wisely adapted, to fulfil special services, such as torpedo boats, &c., and it was wonderful to see how they fulfilled those ends. As Royal Naval Reserve engineer officers they had a very great deal yet to learn, and, united with the experience of the Navy, the engineers of the Mercantile Marine would be more valuable officers than they ever were before. They could already boast that they had done well, but there was still much about which they were all anxious to learn. He proposed a very hearty vote of thanks to Mr. Durston for his able, practical, and kind address, and was sure that their new President had already gained all their sympathies.

The proposition was adopted by acclamation.

The President, in returning thanks, after acknowledging the kind way in which his address had been received, said:—I can assure you that you have my sympathies, and it is a great pleasure to me to know that I have yours. Our friend, Mr. Manuel, like most engineers I think I may say, is a modest man. The other night Mr. Manuel, referring to you gentlemen, said you were not such veterans as we in the Navy. Well, when I think of Mr. Manuel, with the assistance of some hundreds of you gentlemen, taking ships from here to Australia and back, and keeping time, and more than keeping time, I do not think we need question the quality of the veterans you already possess. I beg to thank you most sincerely for the very kind manner in which you have received my address to-night.

A certificate for meritorious progress in mechanical drawing was then presented by the President to Mr. T. M. McLean, who also received the Leslie award, consisting of a handsome book on the subject of his studies. In connection with this subject the President took occasion to express the thanks which he was sure they all felt were due to Mr. Newall, who during the past two years had so kindly undertaken the instruction in drawing, and their regret that they were losing his services. Another gentleman had come forward to carry on the work, and they all wished him every success.

The remainder of the evening was devoted to a smoking concert, and a number of excellent songs were most successfully rendered by Mr. John Bennett, Mr. E. Burchall, Mr. J. M'Auliffe, Mr. A. Hurley, and Mr. J. B. Johnston. Mr. T. F. Noakes officiated as pianist, and Mr. Alderman Kidd was loudly applauded for two recitations, the first classical and the other national in character. The performers were accorded a hearty vote of thanks for their services.

## NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondent.)

THE postponed discussion of the Navy Estimates, which occupied the best part of two Parliamentary working days and nights was not productive of any obviously useful results. There was a good deal of wrangling done by the Irish members, who demand in return for their acquiescence in voting the money for the Navy, a *quid pro quo* in the shape of a training ship at Queenstown, and wish to dictate also what sized ship is to be detailed for the service. The Dockyard and victualling town members also spent some time in explaining the grievance of their constituents, while Messrs. Bowles, Arnold-Forster, and others had to express their views on several naval topics. The business done the first night comprised a promise to the Dockyard members from the First Lord to see them privately at the Admiralty about the matters they wished to bring to his notice, and another to the Irish members that they should have a training ship at Queenstown of suitable size to the requirements of the place. It seems probable that the *Euryalus* will be detailed for this service. On the second day more important questions touching the efficiency of the service were discussed, and Mr. Goschen stated how greatly he was impressed by the improvements effected in naval administration during the last twenty years. The First Lord did not succeed in convincing his hearers that there was not a strong feeling against the objectionable order in Council anent the merchant service officers who are to be admitted on a supplementary list, but generally his defence of the Admiralty was recognised as a good one, and the high tribute he paid to the ability and capacity of his professional advisers well deserved.

### Fleet Engineer Oldknow in the "New Review."

Mr. Oldknow is well known as a talented writer upon professional subjects and especially those referring to that branch of the Naval Service of which he is a brilliant and capable member. The article, therefore, on "Engineering in the Navy," which he has contributed to the *New Review* has attracted much attention and is universally acknowledged as a masterly exposition of the present state of his subject. He has wisely divided his paper into two parts, the *matriel* and the *personnel* of naval engineering. So far as the first part is concerned, Mr. Oldknow has conceived a favourable impression. After glancing backward in a brief but admirable historical retrospect, he deals with recent developments and finds therein much to praise. He is a devout believer in the future of the water-tube boiler, and congratulates the Admiralty on their adoption, nor does he see ought that is unsatisfactory in the latest types of machinery, while he considers we have every right to be proud of the attainments of our latest cruisers in regard to speed. Turning to the *personnel*, Mr. Oldknow finds more to ban than bless. He dates the evil times, upon which he considers we have fallen, from the suppression of the training-ship *Marlborough*, at Portsmouth, and to this fatal step, with the resulting insufficiency of Keyham College he attributes most of the detrimental steps since taken. In six years, he points out, only sixteen officers, who have received a specified training in recognised engineering establishments and technical schools have applied for commissions, and this result has had disastrous effects, for the naval authorities have been at their wits' end to fill up the vacancies. The caustic criticism of Mr. Oldknow of the futile devices which have resulted in admitting insufficiently trained engineers will find an echo all over the country where the subject is understood. But he does not content himself, as so many of the "experts" do, with negative criticism. He has a solution for the difficulty. He would create a grade of warrant engineer officers, by giving warrants to chief engine-room artificers of ten or fifteen years' experience, and enter fresh men to fill their places. The suggestion will doubtless be urged in the House upon the consideration of the authorities and should be discussed on its merits.

### Portsmouth Dockyard.

Another sign of the times, the roofs of the older docks are to be removed, and a beginning has been made with that of No. 5. In the days when the wooden ships took years to put together because that method had its advantages, it was necessary to keep sun and wet from the incomplete hulls, but now-a-days the need for such protection is not so obvious, and as it would cost much money to keep them in repair the sheds are to be

demolished. The *Prince George* having been launched, she has been put into dock No. 13, and is there to await her turn, for just at present there are no hands to turn to on her. The *Gladiator* of the *Arrogant* class of cruiser, is being laid off here in the mouldloft, but it is not anticipated that her construction will be commenced before Christmas. The machinery of this cruiser, as already reported, has been begun in the engineer's department of the yard; probably the ship will be laid down as soon as the slip is ready for her. The *Grafton* has been commissioned, and has carried a relief crew to the *Camperdown* in the Mediterranean. The *Majestic* having made her gun and torpedo trials is back in the yard, and will now be made ready for her 30 hours' steam trial delayed by the mishap to her condensers. It is nevertheless hoped that she may be ready for commission early next year. Other ships building are the *Eclipse* cruiser and *Cesar* battleship. Work goes on slowly on these vessels, but it will not be long now before more hands will be at liberty to push them ahead. Much repairing work is under way and for sometime to come there will be vessels which have developed defects during the manoeuvres to put to rights. The "B" division of the fleet reserve is very strong for it contains at present the *Achilles*, *Neptune*, *Sultan*, the *Narcissus*, *Gibraltar*, *Hecle*, and the second class cruisers *Fox*, *Latona*, *Iris*, *Indefatigable*, *Iphigenia*, *Melpomene*, and *Naiad*. There are also a number of torpedo-boat destroyers which are having repairs effected in the basins.

#### The Entry of Merchant Marine Officers.

The order in council which enables the Admiralty to enter on the regular list of the Navy, several lieutenants and sub-lieutenants of the Royal Naval Reserve, or other Mercantile Marine officers, is still causing much discussion. Mr. Goschen has admitted in the House of Commons that the plan was adopted by the late Board, but the present one accepts full responsibility for it as an exceptional and temporary measure. He declares that it is not intended to weaken or supersede the usual system of entry for executive officers, whose rights, he said, had been taken care of, and would be maintained. Objection, however, is taken to the scheme, both in the regular service where it is looked upon with the greatest disgust and dissatisfaction, and by the merchant marine officers, who hold that the best men of their service, from a professional point of view, will not come forward, and assert that the "blacklegs" will be chosen mainly by personal or political influence. It may be noted that the service papers, while expressing the discontent of the regular officers, do not find fault with the new scheme chiefly on this ground, but take a higher view, and show that it is merely robbing Peter to pay Paul, the men chosen now being those upon which it was relied to find auxiliary support in an emergency of war. The journals representing the merchant navy also raise this objection, and in addition show cause for believing that the terms offered are not such as to secure the services of those best fitted for the work. In the *Times* an extremely well written article calls attention to the fact that as no ameliorative regulations for the present difficulties experienced in increasing the regular list of lieutenants have been put forward, it is more than likely that the nature of the scheme may not be temporary, and that indeed, in spite of the wishes and aims of the naval authorities, a real rivalry has been set up in the two systems of entry. As an example of how the Admiralty intentions in this respect have been nullified by subsequent events, the case of the engineers entered for temporary service is quoted. Many alternative schemes have been proposed, but the only one which appears to have met with general acceptance is to increase the number of Royal Naval Reserve officers serving temporarily with the Fleet.

#### Trials of the Magnificent and Majestic.

The greatest interest has centered in the preliminary essays of these two fine battleships of the Spenser programme, and it is a matter of high commendation and congratulation that both vessels should have come through the trial satisfactorily.

The *Magnificent* was the first of the two vessels to make her trials leaving Chatham for Sheerness on August 26th, for the purpose. On August 28th, an eight hours' continuous run with natural draught was made under favourable condition of weather and with the engines working at a mean of 95.99 revolutions per minute; the average I.H.P. was 10,301, or 301 in excess of the stipulated power. The average speed maintained during the 8 hours' run was 16.5 knots per hour. Very special interest

attached to the next trial because the *Magnificent* is the first large vessel to be fitted with Martin's system of induced draught, although it has been successfully introduced in smaller ships. As a result most satisfactory to the inventor and contractors, Messrs. Penn, it must be stated that anything possible to attain with forced draught was attained with induced draught while some advantages of the latter over the former were particularly obvious. The H.P. indicated for the 4 hours' run was 12,157 with a speed of 17.5 knots, the power being thus 157 horses in advance of contract. The advantages claimed for the new system of draught thus favourably inaugurated are less consumption of fuel, less wear and tear to boilers and furnaces, more comfort to the occupants of the stokehold. The *Magnificent* afterwards proceeded to sea for an exhaustive series of trials, including a 30 hours' continuous run in the Channel, and everything passed off very well indeed. The *Majestic* started out of Portsmouth harbour for her trial on September 9th, but ran aground on the Horse sand, and was there fixed for a couple of hours. On September 12th she made a successful 8 hours' natural draught trial on a run to Portland, realising a mean 10,418 I.H.P. or 418 H.P. more than was demanded by the contract; the speed by patent log was 16.9 knots, the coal consumption per I.H.P. per hour being 2.07 tons. On the 4 hours' forced draught trial (September 17th) 12,197 I.H.P. was realized, with 9 in. air pressure, this giving a speed of 17.9 knots estimated. Unfortunately the 30 hours' trial could not be made, for after leaving Spithead for this purpose the condensers began to leak and the ship had consequently to return to harbour.

#### Forthcoming Naval Publications.

The renewed interest in naval matters which is the outcome of the various agitations of recent years, has given us recently quite a number of publications of capital importance and others of an ephemeral nature. The story of Nelson's life, from the pen of that talented writer Professor Lanchton, is a work which every English boy should read. It is published in the Macmillan series of "Men of Action," and from the unquestioned standing of the writer as an authority upon naval history ranks among the highest work of these excellent publications. Books which are promised this winter on naval subjects include the autobiography of Admiral of the Fleet, the Hon. Sir Henry Keppel, and the biography of the late Admiral of the Fleet Sir Geoffrey Hornby, by his daughter. Three handbooks are also promised by Messrs. Bell & Sons being the forerunners of a series dealing with the Navy which they have in hand. These are entitled, "Admiralty Administration," by Sir Vesey Hamilton, G.C.B., late First Sea Lord, "Torpedoes and Torpedo Warfare," by Lieutenant George Armstrong, late R.N., and "Naval Engineering," by Fleet Engineer R. C. Oldknow. Mr. Jane, who is well known as an artist specially skilled in depicting life in torpedo craft, has written a book entitled "Blake of the *Rattlesnake*," which will give us a picture of the warfare of the future, and Mr. Wilson, the editor of the Navy League publications, is issuing a sketch of naval warfare from 1855 to 1895 which is to be called "Ironclads in Action." Both these works are to be profusely illustrated.

#### Devonport and Keyham.

The *Curlow*, which was paid off here after the manoeuvres, is to resume duty as tender to the Cambridge gunnery school. The *Blanche*, which was commissioned here on September 10th, with a new crew for the *Blonde*, has left for the Cape and will return with the paid-off crew. The *Curacao*, which was taken in hand here to be fitted for service with the Training Squadron, is practically complete, but instead of relieving the *Calypso* she will probably go to the West Indies. An extension of time for the completion of the *Phoenix* and *Algerine* has been granted by the Admiralty, and instead of being finished next month they will not now be ready before January, 1896. The *Sirius*, is to be taken in hand for refit, and it is generally believed that when completed next month she will relieve the *Melampus* as guard-ship at Kingstown. At Keyham the engines of the two new sloops have been finished and will shortly be placed on board. The machinery of the *Talbot* is nearly all in place. The engines and boilers of the *Proserpine* have not yet been commenced. The *Calypso* is the latest arrival for a refit, unless we speak of the *Sharpshooter* as a new comer, although, as a matter of fact, she never seems to be long away from the yard. Of the two cruisers under way here in the construction department, the *Arrogant* is making better headway than the *Furious*, and more hands are at work upon her. The *Renown* at Pembroke is

reported to be so far advanced that she will be ready for steaming round here in the first week of November. In addition to the vessels named the *Racer* and *Phaton* are undergoing extensive refits, and repairs are being effected on board the *Rupert*, *Hecate*, and *Belleisle*, *Black Prince* and *Temeraire*, armoured clads; and the *Renard*, *Spanker*, *Jason*, *Hasard*, *Antelope* and *Speedwell*, gunboats. The *Hermione* has called in to make good defects which were developed during her trials. The *Sharpshooter* is always with us, her last breakdown obliging a postponement of her trials of the Belleville boilers.

#### The Channel Fleet.

With a view to popularise the Navy many expedients have been proposed and tried recently, but perhaps none is so generally regarded with favour as a visit of the ships composing the Channel Squadron to the ports of the kingdom. Early in the month the squadron under the command of Lord Walter Ken left Portsmouth for the Firth of Forth, and anchoring in the vicinity of Edinburgh, at St. Margaret's, made rather more than six days' stay. Next the ships, calling on their way at Berwick, proceeded to Sunderland, which has not been visited in this manner since 1874, when the fleet was inspected by thousands of people. Scarborough then came in for a short stay, where on a previous occasion very bad weather was experienced, but on this visit the fates were more propitious. Lastly, the squadron went to Yarmouth. At Edinburgh the Lord Provost and magistrates entertained 600 bluejackets to dinner, and there were other festivities for the officers. Numbers of people went out to the ships and spent hours on board at every place they called at. At Berwick, although the stay was but of short duration, the vessels were open for inspection and numbers of passenger steamers and pleasure boats took visitors aboard. At Sunderland there were two balls given, and thousands of people from the Tyne and the Wear visited the fleet. Mr. Doxford, M.P., for Sunderland, gave a garden party, and at the invitation of the Mayor of Durham, 60 seamen from the fleet visited that town. At Scarborough banquets were given to officers, warrant officers and men. The last-named were feasted in two batches of about 400 each. There was also a ball at the Spa rooms. Special trains from all parts of Yorkshire, and even so far away as Birmingham and Leicester brought thousands of visitors to see the fleet, and the fine weather which prevailed made it possible for everyone to get on board in comfort. At Yarmouth the same thing happened, and it is not to be questioned that their visits must have great influence in informing the country as to the state and efficiency of its naval defence.

#### Malta and Halifax News.

The reports we have received from the dockyards abroad are all of repairs and renovations. From the North American station our correspondent writes that the flagship has been in hand at Halifax for some time, having been supplied with a new deck, and with teak coverings to her bridges, the after bridge having also been enlarged. Another alteration is in the provision of electrical communication between the bridge on which the officer of the watch is stationed and the sentinel on the life-buoy, so that no time will be lost in dropping the latter if a man falls overboard. The *Mohawk* is in hand at this yard as well as the *Crescent*, and the *Magicienne* was expected to arrive shortly. The two cruisers are to have new decks. Inquiry having disclosed the fact that the water hitherto supplied to vessels here for their boilers is unsuitable, the matter has been reported to the home authorities, and some experiments with different kinds of fresh water are to be made at Portsmouth and Devonport. At Malta the refit of the *Sandfly* is complete and she has made her steam trials. On the departure of the *Ramilles* and *Hove*, the *Collingwood*, *Rodney* and *Arctura* have arrived from Gibraltar, were docked and afterwards left to rejoin the flag. The *Melita* is ready for commission and will hoist the pennant when her new crew arrives in the *Sappho*. The *Camperdown's* new crew has arrived in the *Grafton*, and the *Tyne* will doubtless be sent out shortly to take the place of the supply ship which is to go on to the China station.

#### Chatham Dockyard.

After the launches, which have been a special feature of this yard, the ships under repair are perhaps the most important item for report at present. The fine cruiser *Blake* is having special tubes fitted to her boilers, and with the battleship

*Sanspareil*, is undergoing the most extensive refit of all the vessels in the yard. New shaft brackets are to be fitted to this battleship. The troopship *Tyne* having been prepared here for service as a store-ship to the Mediterranean Squadron in place of the *Humber*, has been commissioned and other vessels which have hoisted the pennant are the *Icarus*, which recently had a thorough overhaul and the *Sappho*. The *Icarus* will relieve the *Nymphe* on the Pacific Station, the *Sappho* takes a relief crew to Malta. The *Severn* is to be brought forward for commission and is now in hand for alteration of armament. The *Leander*, when she returns home from China, will be paid off at this yard. The launch of the *Minerva* on the 23rd of September, gives us another ship in the completing stage. The *Minerva* was begun in December, 1893, and is in a very forward state so that it should not take a long period to finish her off and she may even beat the record of the *Talbot*. Her engines, which have been manufactured here, are quite ready to be placed on board and there is no reason why time should be wasted over her. Our next cruiser to be laid down is the *Vindictive*, of the *Arrogant* type, but it is not likely that she will be fairly taken in hand this year. The *Magnificent* having done her trials is back again and upwards of 1,000 men are at work on her; it is, however, highly probable that she will be delayed by guns, two of which were sent to Portsmouth to form part of the armament of the *Majestic*. The *Illustrious* makes fine progress, and the *Victorious* is so far advanced that the date of her launch, October 19th, has been fixed, and Mrs. Goschen, wife of the First Lord of the Admiralty, will perform the ceremony. This vessel was laid down on May 28th, 1894, but she is advanced to a somewhat further stage than the *Prince George* was when she took the water.

#### Naval Officers' Expenditure.

The subject of the expenditure incurred by naval officers in entertaining foreign officials and especially the case of the officers of the Channel Squadron at Kiel, has been under the consideration of the Admiralty, and it seems likely that at length, something will be done in this matter. Mr. Arnold-Forster, who has taken up the case of the officers, appears to be sanguine of a successful issue, and it is really high time that this drain upon the pockets of the country's servants should cease. Very recently, on the occasion of the visits of the French and Italian fleets to Portsmouth, and the Spanish ships to Plymouth, a moderate allowance has been made to officers to ease the expenditure forced upon them by the hint from higher quarters that entertainments on a large scale were expected, but on foreign stations no attempt has been made to relieve naval officers of this burden. Mr. Goschen, who, doubtless, was voicing on this occasion the feelings of the Treasury, explained that "hospitality is frequently extended by British naval officers to foreign officials in many parts of the world, and often the expense of its exercise by a small ship on an obscure, but necessary occasion, falls as heavily on the individual officers as entertaining on a large scale does on a large ship on an international occasion. But this is, surely, not so much a reason for depriving the officers of the large ship of assistance, as one for giving it to all alike. It would be easy to make arrangements so that in all necessary occasions a share of the cost was borne by the Government, and it would be easy to institute checks against too lavish hospitality, by defining the exact proportion to be borne by the officers, and make one proportionate to the other. As the officers almost always receive hospitality in return this would only be fair and so considered by the service.

#### Launches.

The month of August was wound up with the launch of the *Prince George* at Portsmouth, and the month of October will be ushered in by the launch of the *Victorious* at Chatham. Last month also saw two new ships take the water, the *Minerva* cruiser at Chatham and the *Venus* cruiser from the yard of the Fairfield Shipbuilding and Engineering Co., Govan. Both these vessels belong to what is known as the *Talbot* class, from the ship of that name laid down at Devonport. The *Eclipse* of the same class was launched some time ago at Portsmouth and now the *Minerva* follows suit at Chatham. The other six ships of this class are the *Venus* and *Diana*, *Dido* and *Iris*, *Juno* and *Doris*, these ships being built in pairs by the Fairfield, the London and Glasgow, and the Barrow companies. The *Venus* is the first to take the water of these six vessels. Between perpendiculars the *Venus* measures 350 ft., with a beam of 54 ft., and when fully equipped the normal displacement will be



5,600 tons. Both vessels were launched without a hitch; the christening ceremony in the case of the *Minerva* being performed by Miss Wells, daughter of Admiral Wells, the Commander-in-Chief at the Nore, and in the case of the *Venus* by the Duchess of Montrose. At the luncheon which followed the launch of this latter cruiser Sir William Pearce stated that she had been put into the water within 240 days of the date of laying her keel plates. Two torpedo-boat destroyers have also been launched in September, the *Porcupine* on the 18th being the last of three being built by this firm on the Clyde, the others being the *Lightning*, which is nearly ready for delivery, and the *Janus*, which has made satisfactory trials. The *Haughty* was launched from the yard of Messrs. Duxford at Sunderland on the same day, and the *Hardy* building in the same yard is nearly ready to take the water. Messrs. Laird, of Birkenhead, have also put into the water the *Quail*, the first of the new 30-knot destroyers. This vessel was built in 88 days from time of laying her keel, and thus beats the record in rapid construction.

### DIGEST OF RECENT DECISIONS OF THE HIGH AND APPEAL COURTS OF THE UNITED KINGDOM ON SHIPPING CASES.

#### Injunction to restrain Proceedings in Foreign Court for attachment of freights of Company being Wound-up.

AN extraordinary resolution was passed on the 6th of May, 1893, to wind-up the Belfast Shipowners' Co., Limited. The managers of the company, who carried on all its business and discharged the duties of secretary, were Messrs. Galbraith & Moorhead. On the 13th of June they presented a petition to the Court, and an order was made to continue the voluntary winding-up under the supervision of the Court, and a liquidator was appointed. The petitioners, at the date of the resolution for winding-up, were the largest creditors of the company. Their claim was for money due to them as managers of the company, which was made up of items connected with the s.s. *China*, that had been sold, and a sailing vessel called the *Cavehill*, owned by the company at the time of the winding-up. This latter-named ship had been mortgaged to Messrs. Workman, Clarke & Co., who, before the resolution to wind-up was passed, served a notice on the company and the consignors of the cargo that they, as mortgagees, entered into possession of the ship and freight. At the date of the notice and resolution the *Cavehill* was making a voyage to Boston, where she arrived on the 22nd of May. She was shortly afterwards seized under an attachment issued on behalf of the petitioners out of the Superior Court of Massachusetts, in order to give them a lien on the ship for their claim, which would have priority over the claims of the other creditors. As Messrs. Workman, Clarke & Co. had asserted their rights as mortgagees in possession, the seizure was withdrawn. This firm afterwards sold the ship by auction in this country for a sum more than enough to discharge their mortgage debt, but they had not accounted to the liquidator for the balance because they had not received the freight accounts from Boston. According to the law of Massachusetts, a creditor is entitled before judgment to arrest any property of his debtor that he can lay his hands on, and hold it to discharge any claim he can establish against the debtor. Messrs. Lombard & Sons, of Boston, as agents for Messrs. Workman, Clarke & Co., collected the freight on the *Cavehill* cargo, which, as it was not required for payment of the mortgage debt, formed part of the property of the company for the benefit of their creditors. But Messrs. Galbraith & Moorhead, the petitioners, commenced proceedings against Messrs. Lombard & Sons to attach the freight in their hands; but the liquidator cautioned the petitioners not to continue them as he declared that every opportunity would be afforded to them in the winding-up of proving their claim, and establishing, if they could, any preferential right to any portion of the assets. The liquidator was advised that he had no *locus standi* in the American Court, and that even if he obtained permission in the winding-up to apply for leave to intervene, it was doubtful whether the American Court would permit him to do so. The petitioners did not obtain any leave in the winding-up to commence or carry on the proceedings in

America, the consequence of which might be to give them a preference over other creditors. The company was registered in Ireland. The *Cavehill* was registered in Belfast, and the petitioners were British subjects, having offices in Belfast and London. The liquidator was also advised that the petitioners, according to American law, had no maritime lien, and that the lien obtained by the proceedings referred to was one such as any American subject can obtain in Massachusetts for any debt due to him when his debtor has property in that State. The Irish Court of Appeal held that the petitioners should be restrained from further prosecuting the proceedings in the American Court. It was stated, in the judgment of the Vice-Chancellor in the Court below, whose decision was affirmed by the Lord Chancellor, Chief Baron Pallas, and Lord Justice Fitz-Gibbon in the Appellant Court, that he thought that the case of the *Oriental Inland Steam Co.* (L.R. 9, ch. 557) is precisely applicable to that of the *Belfast Shipowners' Co.*, because the former case "shows that the Court in a winding-up proceeding has the fullest jurisdiction to prevent parties from interfering with the assets of the company in a foreign country, and that one creditor cannot be allowed to get priority over the other creditors by reason of having got possession of the assets." The Lord Chancellor also observed, that in his opinion, the only proper forum for the distribution of the property of this Belfast Co., ordered to be wound up, is the Irish Court.—*In re The Belfast Shipowners' Co., Limited.*

#### Delay through Breakdown of Machinery in connection with Insurance and Charter Party.

The s.s. *Bedouin*, owned by the plaintiffs, was chartered from August 7th, 1889, by the Compagnie Maritime du Pacifique, of Havre, for "the space of one voyage to South America and back, to a port in Europe not north of Hamburg," the freight to be "at and after the rate of £955 10s. per calendar month, and at and after the same rate for any part of a month, and to be paid monthly in advance, and in the event of loss of time by deficiency of men, want of stores, breakdown of engines or machinery, or other causes appertaining to the owners and the progress of the steamer, is thereby delayed for more than twenty-four running hours, payment of hire to cease until such time as she is again in an efficient state to resume her voyage. On the 9th of August the plaintiffs, through their London brokers, insured the freight per *Bedouin*. The essential portion of the ship initialled by the defendant and other underwriters, was as follows, viz.: "Three months at sailing, probably 11th inst., freight chartered, and as if chartered—on board or not on board—full interest admitted—one-third, diminishing each month." A policy, dated August 15th, was drawn, according to the ship, the insurance being described as "for and during the space of three calendar months, commencing 11th day of August, 1889, and ending 10th day of November, 1889, both days inclusive," on "freight chartered, and as if chartered on board or not on board, premium 15s. per cent." In the margin there was a clause, "one-third diminishing each month," and the perils insured against were "of the seas," &c., in the usual form. On the 11th of August, 1889, this steamer sailed with a general cargo under the above charter party from Liverpool, for ports on the west coast of South America, via Havre and Bordeaux. On the 23rd of that month, having called at the latter ports and taken in further cargo, she proceeded on her voyage and experienced a high swell, and afterwards a high sea on the star-board bow, causing the ship to pitch heavily at times and the engines to race, while the after crank pins, main and thrust bearings were found to be running warm. She was brought to an anchor on the 2nd of September, in St. Vincent Harbour, and after the thrust bearings had been there examined no cause for heating could be found. On the following day the *Bedouin* having coaled, left the harbour. On the next day, in fine clear weather with a smooth sea, the thrust-shaft was found to be badly gone at the after-side of the first collar, and the shaft parted shortly afterwards. On the 8th the master made an agreement with a passing steamer to tow him back to St. Vincent, where the ship was safely anchored on the 11th, and a new shaft having been sent out there and fitted, the *Bedouin*, after being delayed twenty-eight days, during which there was a cessation of payment of hire, left on the 3rd of October, and delivered her cargo at the different ports of destination on the West Coast of South America.

## NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from August 26th to September 23rd, 1895:—

Carnt, A. J. engineer to the *Blonde*, to date August 26th.  
 Coad, Hamilton J., engineer to the *Excellent*, to date September 21st.  
 Darley, A. O., engineer to the *Grafton*, to date September 10th.  
 Dathan, W. A., assistant engineer to the *Excellent*, to date September 21st.  
 Douglas, O. E., assistant engineer to the *Camperdown*, undated.  
 Dunn, C. F., assistant engineer to the *Renown*, to date September 5th.  
 Elbrow, G., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.  
 Ellis, J. H. W. H., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.  
 Foster, E. M., assistant engineer (temporary) to the *Scout* undated.  
 Good, J. P., assistant engineer to the *Excellent*, to date September 21st.  
 Graham, W. J., engineer to the *Excellent*, to date September 21st.  
 Hawkins, Hugh, staff engineer to the *Excellent*, to date September 21st.  
 Howlett, W. A., staff engineer to the *Grafton*, to date September 10th.  
 Howlett, W. A., staff engineer has been advanced to the rank of fleet engineer in Her Majesty's fleet.  
 Hurst, Isaac E., staff engineer to the *Excellent*, to date September 21st.  
 Jackson, Thomas P., engineer to the *Hunter*, to date September 9th.  
 Johnson, W. C. assistant engineer to the *Excellent*, to date September 21st.  
 Jones, G. W., assistant engineer (temporary) to the *Camperdown*, undated.  
 Leighton, W. J., assistant engineer to the *Excellent*, to date September 21st.  
 Little, H. J., engineer to the *Magnificent*, to date September 5th.  
 Liversidge, E. W., engineer to the *Icarus*, to date September 24th.  
 London, Arthur J., staff engineer to the *Sappho*, to date September 4th.  
 Meiklejohn, H. J., engineer to the *Blanche*, undated.  
 Michell, G. N. H., fleet engineer, has been placed on the retired list of his rank.  
 Moorshead, J. E., assistant engineer to the *Excellent*, to date September 21st.  
 Palmer, Alfred, fleet engineer to the *Camperdown*, undated.  
 Patterson, Geo. T., acting engineer to the *Sappho*, to date September 24th.  
 Pearce, W. W., engineer to the *Camperdown*, to date September 10th.  
 Pill, J. H., chief engineer to the *Excellent*, to date September 21st.  
 Pratt, W. H., assistant engineer (temporary) to the *Camperdown*, undated.  
 Ramsay, George, chief engineer to the *Blanche*, to date September 10th.  
 Rawling, S., chief engineer to the *Scout*, undated.  
 Read, A. T. P. assistant engineer to the *Excellent*, to date September 21st.  
 Robertson, G. (probationary), assistant engineer to the *Camperdown*, undated.  
 Shirvell, James, staff engineer to the *Excellent*, to date September 21st.  
 Silk, E. E., engineer to the *Empress of India*, to date August 26th.  
 Spencer, Arthur P. S., assistant engineer to the *Scout*, to date September 24th.  
 Ware, C. G., assistant engineer to the *Grafton*, to date September 10th.  
 Wood, William H., engineer to the *Majestic* to date September 5th.  
 Wormold, George, assistant engineer to the *Blonde*, undated.  
 Wright, Wallace, engineer to the *Pembroke*, to date August 26th.

## HOAR &amp; BROWN'S HARDWOOD MARKET REPORT, SEPTEMBER 24th, 1895.

TRAK.	Timber Loads.	Planks Loads.	Blocks Loads.	Total Loads.
Stock, 2nd Sept.	5,643	2,769	46	8,457
Landings	658	80	—	738
	6,300	2,849	46	9,195
Deliveries	667	119	2	788
Stock, 20th Sept.	5,633	2,730	44	8,407

The stock of logs in the docks remains practically the same as last month, and the deliveries have fallen very short, being only 667 loads against 1,573 loads, for the same period in August. There has been an increased business in floating cargoes, several having changed hands at fairly remunerative prices, indicating some measure of confidence in the looked-for revival in trade.

Business in planks appears to have been smaller than last month by about 100 loads, but the next month's returns may be expected to show to better advantage, as several large sales have taken place, delivery of which is deferred.

MAHOGANY.—Although trade is unusually quiet stocks are diminishing, and good timber is very scarce. Should any fuller demand arise, there would be a difficulty to meet requirements.

Both Honduras and Tobacco mahogany of large sizes is much wanted.

African is being imported rather largely, and the poor quality of this class of wood has a tendency to depress values.

Cuba wood is beginning to find purchasers in consequence of reported short supplies, due to the insurrection, and large wood is now commanding increased prices.

CEDAR.—The market has been lively during the last three weeks and quotations have advanced about 30 per cent. There is very little stock obtainable, and enquiries are coming in daily from continental purchasers.

Although the stock is large in Bremen, there is an opening for speculation at the low figures that have been ruling here.

Mexican wood, which was almost a dead letter, a short time ago, has all changed hands at a good profit.

WALNUT.—Logs have been selling at the minimum, but good large sizes are still required, and extra prices could be obtained.

Lumber of good quality has not been arriving so freely as of late, and there is a fair demand. Quotations are low for ordinary parcels and stocks large.

WHITEWOOD.—Logs are going very low, and boards have been sold below the record. Really good sound wood in logs is scarce, but a supply of this class would sell well, being greatly wanted.

KAWRIE PINE.—Small quantities are frequently arriving, and prices remain about the same. Stocks are quite large enough for requirements.

AMERICAN OAK.—Large parcels have changed hands lately at very low figures. Wide quartered boards are selling well.

A decided change for the better has shown itself in trade generally, and there is every prospect of the continuance of this movement.

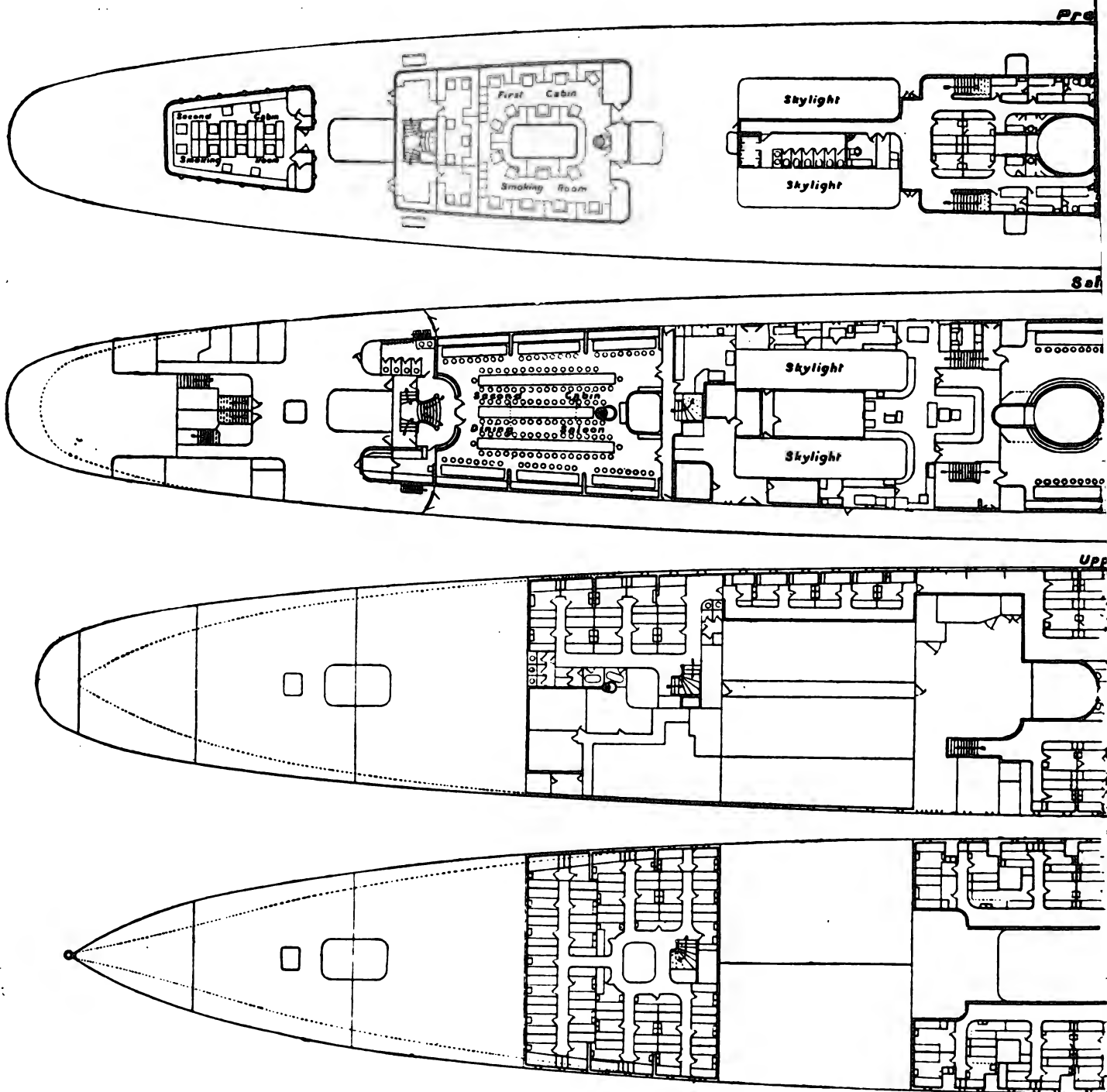
## INDUSTRIAL AND TRADE NOTES.

## THE CLYDE AND SCOTLAND.

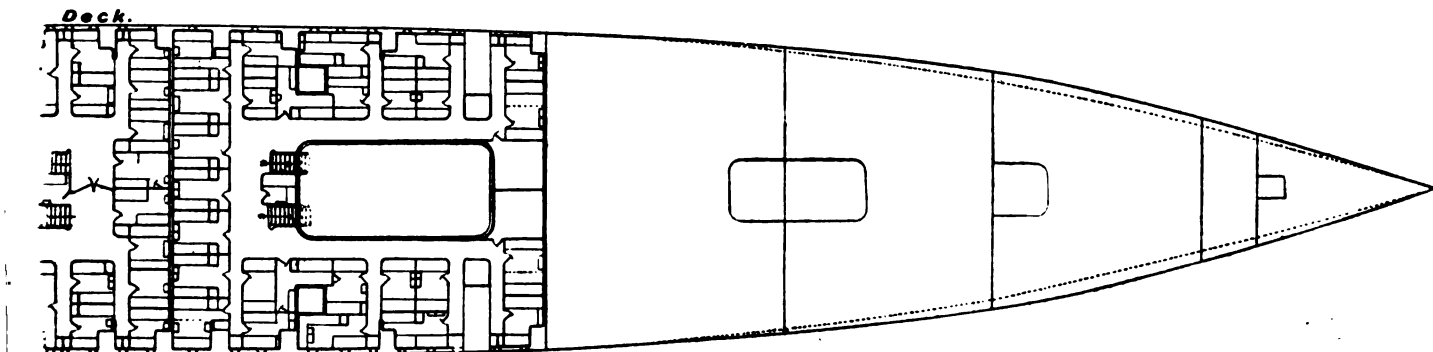
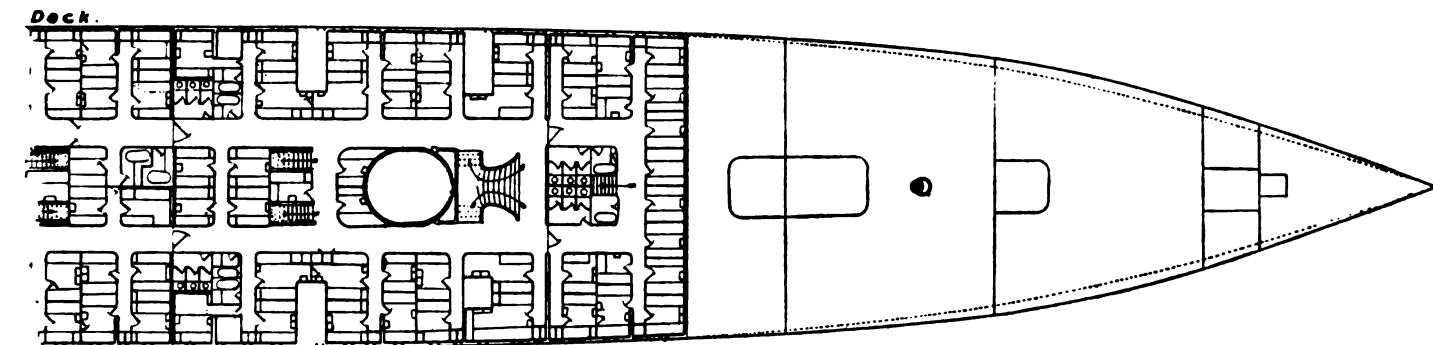
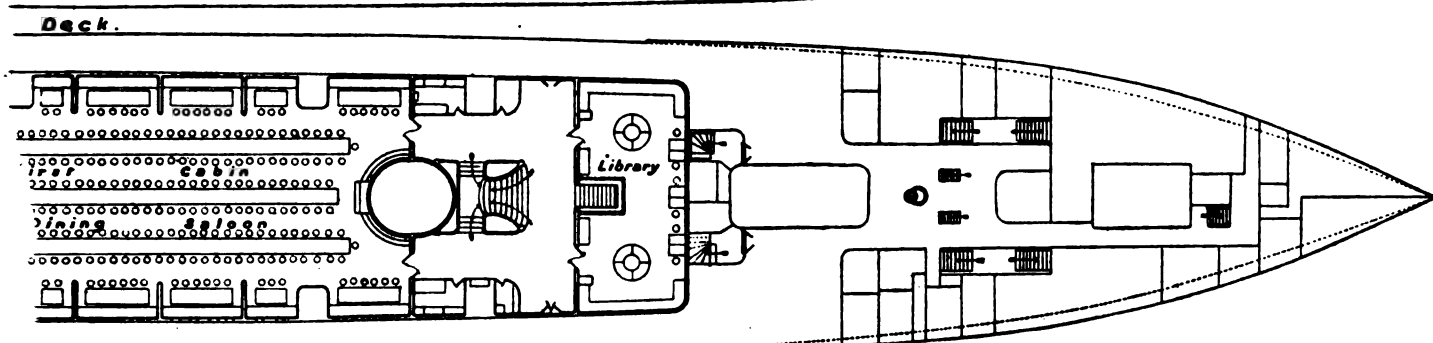
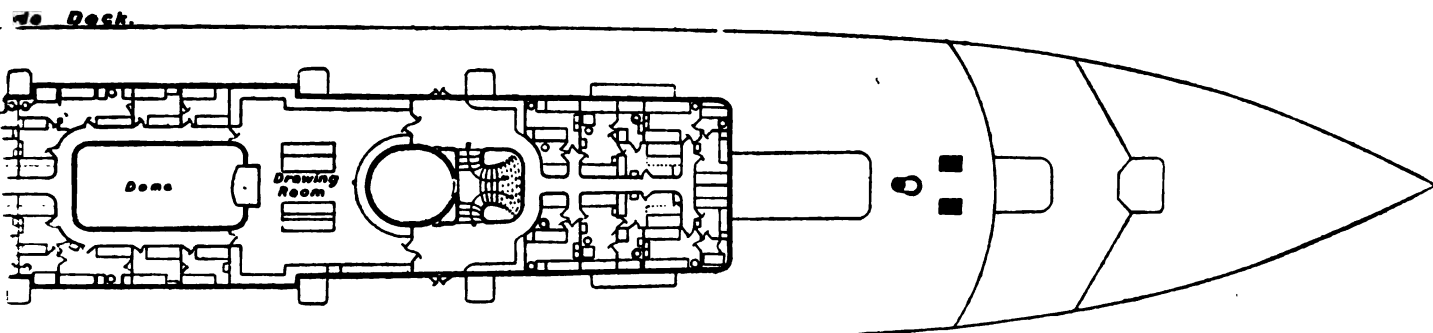
(From our own Correspondent.)

THERE is practically no change in connection with the Clydebridge steel workers' strike for the abolition of the contracting system and introduction of tonnage rates. Several meetings of the men have been held during the month, and after reviewing the general position of affairs they have all terminated with a resolution being passed to remain firm until their demands have been conceded. The works continue solidly idle. Some effort has been made by the contractors to secure men to take the place of the strikers, and get the mills set agoing again, but these have been so far unsuccessful.

During the past month the leading shipbuilders on the Clyde and the north-east coast received invitations from the Admiralty to submit tenders for the construction of three first-class



THE AMERICAN LINERS, TWIN-SCREW STEAMERS,



cruisers provided for in this year's Estimates. The vessels are the largest yet designed, with the exception of the *Terrible* and *Powerful*, building respectively at Clydebank and Barrow, and it is therefore probable that no firm will get more than one of the cruisers, and even then the firm will require to have a good record. Earl Spencer, in his memorandum issued some months ago, stated that the new vessels were to be improved *Blenheims*, but indicated that the designs were not settled upon. Everything is, however, now practically arranged. The new vessels are to be 484 ft. long and of 69 ft. beam, the displacement being 11,000 tons at normal draught. The *Blenheim* is only 375 ft. long by 65 ft. beam, and the displacement 9,000 tons, the difference in the case of the new cruisers being due to the determination to get a high speed. The *Terrible*, it may be here stated, is 500 ft. by 71 ft. 8 in. beam and 14,200 tons displacement. The nearest approach to the new vessels is the much-talked-of Russian cruiser *Rurik*, which is practically of the same displacement 10,923 tons, but is only 396 ft. by 67 ft. beam. The machinery is also to be included in the tenders to be submitted by the builders, but in addition engines and boilers of the same power are to be constructed for a fourth cruiser of the same type to be built at the Pembroke Dockyard. The vessels are to have twin screws, the results claimed for the triple screws of the United States *Columbia* not having influenced the technical advisers at the Admiralty. As to the design of the machinery, much is to be left to the several firms invited to send in tenders, the usual limits as to weight, &c., being specified. Water-tube boilers of the Belleville type are to be adopted and this choice has been made after much consideration. The Admiralty have experience, direct and otherwise of almost all types of boilers, but it would seem that for large vessels expected to run at high speed for long distances they prefer the *Belleville* type. Triple-expansion engines are specified, and as to the power it is practically settled at 22,000 I.H.P., which should give a speed of between 21 and 22 knots—if, indeed, the latter be not exceeded. The sum voted for the three contract boats in this year's Estimate is £143,246. The new cruisers will depend for protection upon an armoured deck, and the arrangement of coal-bunkers, which will also be utilised for the protection of passages for the ammunition as in the case of the *Terrible*. There will be a heavy gun forward, and one aft, well protected by shields, while a very large installation of 6-in. quick-firing guns will be installed and fully protected by casemates.

There is a prospect that the Norwegian Government will shortly invite Clyde shipbuilders to submit tenders for the construction of two ironclads and three torpedo gunboats. The ironclads, for which tenders will be invited first, are to be about 274½ ft. long on the waterline, with an extreme beam of 48½ ft., and at 3,408 tons displacement to have a draught of about 17 ft. The estimated cost of each ship is £190,000. The ships will have a barrette fore and aft, each with a 25 centimetre 29·8-ton breech-loading gun, with 20 rapid-firing guns, four of them 4·6 in. quick firers. The engines are to develop under natural draught 3,708 I.H.P., giving a speed of 15 knots, while under forced draught the speed is to be 16 knots. For the three torpedo boats the grant amounts to about £47,000. In addition the Norwegian Government propose to carry out other work, a Naval Commissioner having been appointed who has prepared a preliminary report, the first result of which will be the ordering of the boats above mentioned.

Messrs. William Beardmore & Co., Parkhead Forge and Steel Rolling Mills, have entered the field of competition with Sheffield manufacturers and are producing for the first time in Scotland steel armour-plate for use in the construction of battleships and cruisers. It is surprising that this important industry has not been taken up before, especially when one considers that the Clyde has long been famous for the construction of Government cruisers, and, as in the case of the *Ramillies*, and the *Terrible*, builders have had to go to the expense of obtaining the heavy armour plating from over the Border. Messrs. Beardmore have already spent many thousands of pounds in building suitable furnaces improved machine shops, with costly overhead cranes to expedite the work, and still more capital is being laid out in order to ensure success for the new and important industry. It is evident that commercial success depends on a distinct and strong personality as the venture is being carried on single handed and without the assistance of experts from outside—the gigantic work being conducted with the ordinary staff. In

doing this it is not easy to realise the enterprise exhibited by the head of the firm unless one is intimately acquainted with the process of producing one of these valuable plates. The intricacies of the press, the machinery for rapid ripping and planing, the scientific care and attention in the carburising process, and the most accurate machinery for boring, tempering, and grinding to a finished nicety would puzzle an able and competent engineer. In carrying out the extensions Messrs. Beardmore have as much as possible kept them in the hands of local employers, Messrs. Arrol's Roof and Bridge Co. having had a fair share of girder roof work in connection with the shop erections. Messrs. Shanks & Co., Johnstone, have made the machines, and Messrs. D. Stewart & Co., Limited, Glasgow, the engines for driving the machinery.

The annual meeting of the Steel Co. of Scotland was held on the 18th ult., in the Accountants' Hall, West Nile Street, Glasgow, Sir Charles Tennant in the chair. From the report submitted it appears that the company have met with bad times of late; in 1894 there was a loss of £16,894, and although this year there is a profit of over £14,000, there is no possibility of paying a dividend. In the face of the depressed trade, however, the latter figures may be considered very satisfactory, and especially when it is considered that the steel works remained closed during the late coal strike for some time, of which three months belonged to the year under review. During these three months the company incurred a good deal of inevitable expenditure, about £6,000. As to the future of the company, the chairman offered a word of caution against too sanguine expectations. He had no feeling of uneasiness, but the immediate future of the company depended upon the course of prices. During the last two or three months a great deal of steel had been sold, and they had the value well covered with their purchases of pig-iron. But pig-iron had risen considerably, and possibly it might rise a good deal more, and it would be unreasonable to suppose that they could continue to buy coal till next July at the low rates ruling during the last six months, and up till now the selling price of steel had not responded in adequate proportion. The average selling price for last year brought 3s. per ton less than the previous year, which had broken the record for lowness.

In offering the appointment of engineering manager to Mr. James McKechnie, the directors of the Naval Construction and Armaments Co., Barrow-in-Furness, make a peculiarly suitable choice. Mr. McKechnie's training admirably fits him for the position, as that training was obtained on the Clyde here and of a very varied character. Besides other general engineering works he served in David Rowan & Son's, Messrs. Stewart, and Mirrlees, Watson & Yaryan, before it passed under its present copartnery. He was a draughtsman and chief pattern-maker at Clydebank when the earlier greyhounds were built, and went for a short time to Fairfield as chief draughtsman when the *Oregon* was built, but subsequently returned to Clydebank as assistant manager. He was there when the *America* was completed, and continued under Mr. Dunlop for several years; when, as now, splendid work naval and mercantile was being done. On the invitation of Sir Charles Palmer he went to Bilbao and organised works for the construction of machinery for three cruisers. These have now been completed, and the splendid results got on the steam trials probably encouraged the Barrow people in their choice.

The annual report of the Clyde Navigation Trust shows that the revenue for the year, ending 30th June, amounted to £353,813, being a decrease of £18,163 compared with the previous year. The total expenditure was £344,015, leaving a surplus of £9,798. The expenditure on new works was £178,120. The borrowing powers of the trustees amount to £6,250,000, and the balance of this sum still available is £407,766. For the year ending 30th June, the goods imported amounted to 5,070,392 tons, a decrease of 565,430 compared with last year. There has been a decrease in the tonnage of vessels arriving at the harbour of 111,477 tons, the total being 3,667,064 tons. This is certainly not a very encouraging state of affairs, but considering the depressed condition of trade all over the world, particularly the paralysing effect on almost all the Clyde industries of the late disastrous coal strike, everyone was perfectly prepared for a considerable fall in the revenue. At one time the trustees feared that the decrease would be even greater but during the month of June they had an increase over the same period in 1894 of £1,046. During July the increase was £2,089, and in August £3,486; so that for the first two months



of the new year there is an increase of \$5,525. The Trust have now provision for a much larger trade. There is large accommodation for mineral traffic, the sheds and crane accommodation is better perhaps, but certainly second to none in the United Kingdom. If full use is made of the great facilities extended to shipowners and the shipping trade there is no doubt that next year a much better statement will be submitted.

Messrs. The Fairfield Shipbuilding and Engineering Co., Limited, Govan, received instructions about mid-month from the Admiralty to supply a new low-pressure cylinder and fittings for the starboard engines of the torpedo gunboat *Hasard*, fitting out at Devonport.

Messrs. A. Stephen & Sons, Linthouse, booked an order towards the beginning of the month to build a couple of steamers of about 3,000 tons each. The new vessels are intended for the trade between New York and the West Indies.

Messrs. James & George Thomson, Limited, Clydebank, have launched the last of the seven gunboats they were under contract to build for the Spanish Government. The vessels are to be used in suppressing the insurrection in Cuba, and it was stipulated that the lot should be delivered within three months. The contract was signed in the second week in July, but owing to the intervention of the Fair holidays the keel of the first vessel could not be laid till the 22nd of the month. This vessel was launched on the 24th of August, so that the actual construction required only thirty working days. Two days later the second vessel was launched, and after the lapse of a week other two left the stocks. The remaining three were disposed of with similar dispatch, the last vessel having been launched on October 1st, ten days within the time contracted. The official trials were gone through in a manner which gave entire satisfaction to the representatives of the Spanish Government, the mean speed obtained being three-fourths of a knot over the contract requirement. The gunboats are of 300 tons measurement and were launched with boiler, funnel and masts on board.

Messrs. Napier, Shanks & Bell, shipbuilders, Yoker, secured an order early in the month to build an armed steel screw yacht for President Peureux, of San Domingo. As this yard has been absolutely bare for some time, this order will set things going again. The engines of the yacht will be supplied by Messrs. David Rowan & Son, Glasgow.

Messrs. Scott & Sons, shipbuilders, Bowling, completed, early in the month, the overhaul of the screw steamer *Banshee*. This steamer was built about eighteen months ago by Messrs. Mackie & Thomson, Govan, and has been laid up since, with the exception of three weeks, when she was specially chartered. She has been sold by the builders to Mr. Pickering, of Hull, who has had her overhauled, and will run her between Hull and Scarborough with passengers, for which she has special accommodation.

Messrs. Blackwood & Gordon, shipbuilders and engineers, Port-Glasgow, received an order about mid-month to build a powerful steel screw steamer for the Dublin Steamship Co. Like the *Wicklow*, recently launched by the same builders for the same owners, the new vessel is to be engaged in the passenger and cattle carrying trade between Dublin and Liverpool.

Messrs. Carmichael & McLean, the new shipbuilding firm, Greenock, have commenced operations with a sailing vessel of 3,300 tons.

Messrs. David J. Dunlop & Co., Port-Glasgow, booked an order about mid-month to construct a steel twin-screw steamer of 205 ft. keel for cable-laying purposes. The engines, which will be of the triple-expansion type, will be supplied by the builders of the vessel.

Messrs. Murdoch & Murray, Port-Glasgow, towards the middle of the month, contracted to build a steel twin-screw steamer of 225 ft. keel, for passenger and cargo service at the Brazils. The engines, of which there will be two sets, and of the triple-expansion type, will be supplied by Messrs. Lees, Anderson & Co., of Glasgow.

Messrs. The Ailsa Shipbuilding Co., Troon, during the month, secured an order to build a yacht of large dimensions, her length measurement being 300 ft., from designs of Mr. G. L. Watson, Glasgow. They were also successful in securing the contract for the construction of a large steamer for the Indian service, and prospects of work in the yard during the coming winter are consequently very good.

A new steamer line between Dundee, Perth, Newburgh,

Arbroath, and Montrose has been started this month. A steamer has been chartered, and will trade between the above ports with general cargo regularly every week. The North British Grain Storage and Transit Co., of Leith and Glasgow (Patmore & Co.), are the charterers. A company is at present being formed in Dundee for the purchase of two powerful steamers to be engaged in the cargo trade between Dundee and London. The vessels, which are Clyde built, and are quite new, have a carrying capacity of about 700 tons each, and will steam from 12 to 13 knots per hour.

The Glasgow iron barque *Clan Ferguson*, 799 tons net register, built in 1876 by Messrs. J. Reid & Co., Port-Glasgow, for Messrs. T. Dunlop & Sons, Glasgow, was sold at the beginning of the month to Scandinavian owners by Messrs. A. C. Gow & Co., for \$3,250. Messrs. Burrell & Son, Glasgow, during the month bought the French steamers *Tropique* and *Pacificque* for about £15,000 for the two boats. The Clyde-built steel ship *Slieve Donard* was sold to Messrs. Thompson, Anderson & Co., Liverpool, for \$3,250. This vessel is 1,788 tons register, and was built at Port-Glasgow in 1883.

## TRADE NOTES FROM THE TYNE, WEAR, TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

### THE TYNE.

**Shipbuilding.**—Since last month, the prices of shipbuilding material have stiffened considerably, steel plates and bars being now quoted at from 10s. to 12s. 6d. per ton higher than at the period named. This has not arisen, however, through any sudden influx of orders from shipbuilders, but rather through a rise in the price of raw material, and a stimulated demand from consumers in other branches of industry. So far as the shipbuilding trade is concerned, indeed, business shows little animation, and, as we ventured to predict two or three months ago, there is very little likelihood of anything in the nature of a "boom" occurring in the present year. At the moment of writing, rumours are in the air of a simultaneous great strike on the Clyde and at Belfast, and such an occurrence—which would be a calamity to the districts named—would be an undoubted advantage to the North-East coast. The advantage, however, would only be temporary, and business men in this centre have such a horror of strikes, that it is probable they would not care much for any transitory benefit derived from so questionable a cause. For the sake of all concerned it is to be hoped that in the settlement of the disputes now pending in the great Scotch and Irish centres of shipbuilding, reason and common sense will rule, and a resort to the rough arbitrament of force will be avoided. The continued lowness of freights, and consequent unprofitableness of shipowning as a business, is the chief deterrent to any very marked revival in shipbuilding; for capitalists will not invest unless they see some prospect of a return. A rise of freights would, of course, very speedily attract capital, and many embryo schemes for the building of new steamers would be quickly developed to maturity. In present circumstances, it is reassuring that the conditions prevailing in industrial and commercial affairs abroad favour the prospect of an advance in freights at no distant date, and the advent of such an advance affords the only sure basis of hope as regards full and general employment in the shipbuilding yards.

Though a degree of quietude—not absolutely approaching to slackness—is the characteristic of the shipbuilding industry over the North-East coast as a whole, this is not the case at the Elswick establishment of Messrs. Armstrong, Mitchell & Co., where an amount of briskness exists that is quite unparalleled. There are four large cruisers and a battleship on the stocks, and in the initiatory departments further new work is being prepared. Every possible expedient, consistent with the turning out of sound work, is being resorted to to expedite the execution of contracts, and there is reason to expect that this will be a record year for the establishment in the matter of output. That the great firm which rules this admirably appointed yard, and the immense steel works, ordnance works, &c., connected with it, is enjoying an unchecked career of prosperity may be judged from the fact that the lucky shareholders have just received a dividend of 11½ per cent., the net profits for the year amounting to over £255,000.

Messrs. Wood & Skinner are completing beside the yard, the ferry steamer ordered by the Tyne Commissioners, and a fishing vessel ordered by North Shields owners. They have recently booked orders for two coasting steamers of 900 and 400 tons burthen respectively, and they have a good sized vessel in an advanced stage of construction on the stocks. At Messrs. Dobson's yard business keeps pretty active, and at Messrs. Armstrong and Mitchell's Low Walker yard there is more work in hand than was noticeable a month ago. The initiatory departments at Messrs. Wigham Richardson & Co.'s yard are now very busy, and a good winter's work for the outside men, as well as for those employed under cover, is anticipated.

Messrs. Hawthorn, Lealie & Co., have also sufficient work to keep their large force of hands fully employed throughout the winter months, and possibly some time longer. The firm will launch in October, the twin-screw steamer which they are building for the owners of the Russian volunteer fleet, and the event will be of exceptional importance, as the vessel—both as regards design and equipment—will be among the very finest ever built on the Tyne. It is no small testimony to the high quality of the work turned out by the firm, that the foreign syndicate named invariably come to them when they want to make a further addition to their splendid fleet. The firm have now built some half-dozen vessels for this special service, all of which are quite unique as specimens of naval architecture, and though admirably equipped for commercial purposes, are easily convertible into fast armed cruisers, should the need arise. The state of business at Messrs. C. S. Swan & Hunter's yard continues satisfactory, but the adjoining establishment (Messrs. Sohlesinger & Davis's) still presents the cheerless aspect resulting from unoccupied berths and idle machinery.

The Palmer's Co. have launched the last of their Admiralty-ordered vessels—the torpedo destroyer *Porcupine*—and have now room to put down other vessels of the same or a larger class, should they be fortunate enough to receive the necessary orders. From the eminently satisfactory trials of vessels built at the Jarrow yard, it is hoped—and not unreasonably—that whenever any further vessels are ordered for the strengthening of our own fleet, Jarrow will get a share.

The Tyne Shipbuilding Co. have still a large amount of work in hand, and at Messrs. Readhead's yard night work is being resorted to in the frame-turning department. Messrs. J. T. Eltringham & Co., who recently launched two handsomely-designed tug-boats, ordered by the Manchester Ship Canal Co., have other orders now in hand, and their yard is likely to be kept fairly busy for some months to come. The extensive boiler works of the same firm continue to be kept actively employed.

That certain of the graving dock proprietors at South Shields are determined to keep pace with the times is evidenced by the alterations now in progress. Messrs. Morallees's dock, Thrift Street, has been lengthened and widened to an extent equal to the accommodation of vessels of a very large class, and very powerful plant—including a 50 H.P. gas engine—has been put down with a view to the carrying out in the most effective and economical manner, repairs on iron and steel vessels. One of the numerous docks at West Holborn is also being greatly enlarged.

**Engineering.**—The North Eastern Marine Engineering Co. have orders to supply, from their Wallsend works, the machinery and boilers required for two vessels now building at the yard of Messrs. Wood & Skinner. One of the vessels is for Norwegian, and one for local owners. Among other orders in hand at the Wallsend and Slipway Engineering Works, is a set of triple-expansion engines to be sent to Italy, and fitted there. The firm have also an order to re-engine a thirty-four years old Russian steamer that has recently arrived in the Tyne. It may be added that the vessel was built on the Tyne and she is certainly no discredit to her builders, seeing that after so many years' service she is considered sound enough for new machinery. At the other marine engineering works business keeps fairly good.

The Combination Metallic Packing Co., Lombard Street, Newcastle, have received a good many orders for their speciality lately in connection with the machinery equipment of war and passenger vessels building on the Tyne, and at other centres. Their works are consequently very busy.

The St. Andrew's Engine Works (Messrs. Donkin & Co.), are kept steadily going, and enquiries for the various specialities manufactured by the firm continue to be numerous.

Mr. George Noble, the representative in Newcastle of the

Mirrlees, Watson & Yaryan Co., Limited, have received an order for two large "Yaryan" evaporators, to be fitted in the Chilean cruiser now building at Elswick.

At the Newburn works of Messrs. John Spencer & Sons business is pretty active, more especially in the plate-rolling mill, where boiler plates of special quality are manufactured. The Ouseburn branch of the firm's works is also showing signs of improved business.

Mr. George Tyzack, of South Shields, continues to receive, both from home and foreign shipowners, numerous orders for his well-known patent stockless anchors, and the works where they are produced are kept busy. The premises formerly occupied by the Tyneside Engineering, Repairing and Shipbuilding Co., at South Shields, are for sale. They are admirably situated, and are fully equipped with modern plant.

**Paints, &c.**—Messrs. Adamson & Co., of Tyne Dock, have brought out a new anti-fouling composition, with which they have already painted a number of vessels. The results have been in every case satisfactory, and a good sale for the article is anticipated. The Mica Lubricant Co., South Shields, have done a very large business this year, the sales of their speciality, both to home and foreign consumers, having exceeded the amount sold in the corresponding period of any previous year. The Patent Mica Grease finds its way to the farthest parts of the earth, and is apparently as much appreciated in Japan as it is in England. The white marine glue manufactured by Messrs. Walters & Co., of Liverpool, is becoming very popular in this district, and most of the leading shipbuilding firms are now using it in connection with the construction of passenger and other vessels provided with wood decks. The rust-destroying speciality "Ferroline," introduced by the same firm, is also coming largely into use as a first coating for iron and steel surfaces.

**Electric Lighting.**—Messrs. Clarke, Chapman & Co., of the Victoria Works, Gateshead, are just now exceedingly busy in the electrical department, having no less than 22 ship installations in hand. Among these are included three war vessels, namely H.M.'s ships *Powerful*, *Juno*, and *Doris*. A large proportion of the vessels are to be fitted with search-light plants for the passage of the Suez Canal. In addition to the foregoing, the firm have in hand a large amount of Suez Canal projector work for other electrical engineering firms, besides some large contracts in other branches of electrical engineering, including electric transmission of power. As an instance of the expeditious manner in which the firm are now enabled to turn out work, it may be mentioned that they very recently supplied to Messrs. J. & G. Thompson, Limited, of Clydebank, the generating plants for three Spanish gunboats in much less time than was stipulated for. The vessels having to be finished and delivered at remarkably short notice, it was necessary that no time should be lost in providing the various accessories required for their equipment: the contracts for the three plants were accordingly placed with Messrs. Clark, Chapman & Co., on the understanding that they should be completed in twelve, sixteen, and twenty-one days respectively, a stipulation which was in every instance anticipated by nearly three days. This, we think, is a striking example of what can be done by intelligent management, backed by superior productive resources.

#### THE WEAR.

**Shipbuilding.**—With the exception of one or two firms, Sunderland shipbuilders do not seem to have been particularly fortunate lately in securing a share of such work as was going. The Sunderland Shipbuilding Co., Limited, have obtained orders for two vessels of comparatively small tonnage, and the building of the first of these is now being proceeded with. Messrs. Bartram & Sons have also added to their prospective work engagements, and have now on the stocks two large vessels in the framing and plating stages. Messrs. J. L. Thompson & Sons have all their berths occupied, and the yard still affords a striking contrast to most other shipbuilding establishments, in the fact of its unvarying briskness. The yard of Messrs. Short Bros. is at present having a somewhat bare appearance, but it is believed that the firm have orders, and that before many weeks are past a more promising aspect will be given to the establishment by the putting down of one or two keels. Messrs. Pickersgill have received from Liverpool owners an order for a vessel of about 4,000 tons carrying capacity, the construction of which will be proceeded with immediately. It is reported that the firm have

booked orders for another vessel within the past few days, and we have little doubt that the rumour will prove to be correct. The yard of Messrs. John Priestman & Co., is well filled with work, and at the South Hylton yard there are two small vessels on the stocks.

**Engineering.**—The North-Eastern Marine Engineering Co., Limited, are now finishing at their Sunderland works, the machinery equipment of a large foreign-ordered vessel, built by Sir Raylton Dixon & Co., of Middlesbro'. The company have a fair amount of work in the shops, among the orders in hand being the engines and boilers for a vessel to be built by the Sunderland Shipbuilding Co. The Palmer's Hill Works are kept steadily going, night work being resorted to in some departments. At the Southwick Engine Works (Messrs. George Clark, Limited), slackness is now very apparent, and in some departments the services of operatives have had to be temporarily dispensed with. It is understood, however, that the firm have just booked some orders, the execution of which will soon make a change for the better.

At the Sootia Engine Works (Messrs. William Allan & Co.) slackness also exists, and it is thought that short time will have to be resorted to.

The new engineering works established at Wreath Quay, by Messrs. Jamieson & MacColl, are now completely fitted up with the necessary plant and machinery, including two powerful travelling cranes for lifting large castings, boilers, and other heavy substances; hydraulic rivetting plant, &c., and as they have the means of turning out work, both economically and quickly, there is little reason to doubt that they will get a share of such contracts as may be placed upon the market.

Steady work continues to be the feature at the establishment of Mr. A. A. Rickaby (the Bloomfield Engine Works), and it says much for the quality of the work turned out, that during the whole period of the depression the works have never been absolutely slack. Messrs. John Lynn & Co. are well supplied with orders for the specialities manufactured by them, and at the Sunderland Forge business is pretty active. There is just now but little doing at the Monkwearmouth Iron Works, but the Monk Street Foundry and Brass Works are busily employed. It is understood that part of the premises formerly occupied by Messrs. Lumsden & Co., chainmakers, is about to be utilised by a firm who propose to supply certain indispensable accessories of steamships at a price much below the cost to shipbuilders when manufactured by themselves.

**The Hartlepoons.**—During the past two months the following vessels, engined by Messrs. Thos. Richardson & Sons, Limited, have had successful trial trips:—The s.s. *Lady Furness*, built by Messrs. Furness, Withy & Co., proceeded from Hartlepool, August 7th, on an extended trial of her machinery in Hartlepool Bay, when a speed of over 12 knots was obtained, the engines working most satisfactorily. This vessel is a substantial type of the modern cargo boat, measuring nearly 340 ft. in length, with a very large measurement, and deadweight capacity, and is built throughout of Siemens-Martin steel, to the highest class at Lloyd's. In her construction special care has been taken to make all parts as strong as possible in view of her intended employment in the heavy deadweight trades. The engines are of the triple-expansion type with cylinders 24 in., 40 in., 66 in., by 45 in. stroke, and steam is supplied by two extra-large single-ended boilers working at 160 lbs. pressure. The vessel has been constructed under the supervision of Captain Tregerther, on behalf of Mr. George Sydney Coram, of London (the owner), who was present on the occasion of the trial, and seemed highly pleased with the ship and her machinery. The s.s. *Bruma*, built by Sir Raylton Dixon & Co., Middlesbro', for Captain Andreas Olsen, of Bergen, was taken to sea for her official trial trip on September 7th. This is a spar deck vessel, her principal dimensions being—331 ft. by 42 ft., and 23 ft. 8½ in. deep, with a deadweight carrying capacity of over 5,000 tons. The engines are triple-expansion, having cylinders 24 in., 38 in., 64 in. by 42 in. stroke, and steam is supplied by two large single-ended boilers working at 160 lbs. pressure. The engines worked very smoothly during the trial trip, which was highly successful, a speed of 11½ knots having been attained without difficulty. On the same day the s.s. *Pasco*, built by Messrs. Furness, Withy & Co., also went on her trial trip in Hartlepool Bay, and had a most successful run, a speed of 11 knots having been reached and maintained. This vessel, which has been built to the order of Messrs. Thos. Wilson, Sons & Co., of Hull, is classed under the British Corporation rules,

which embody many important features in connection with the distribution of strength in the various parts of the structure. The engines are triple-expansion, having cylinders 20½ in., 33 in., 56 in. by 36 in. stroke, the steam pressure in this case being 180 lbs. to the square inch. The owners were represented on board the vessel by Mr. Wilkins and Mr. Spear, the surveyors to the company, under whose supervision the ship and engines have been built. During the trial the machinery worked to perfection, giving complete satisfaction to all. At the sheerlegs Messrs. Richardson are fitting the engines, &c., on board a large cargo boat recently launched from a Hartlepool yard.

Very important extensions are being made in connection with the forge department of the Hartlepool Engine Works, a large steam hammer and accessory plant, by Messrs. Davis & Primrose, of Leith, being in course of erection. This very powerful plant will enable Messrs. Richardson to deal with the heaviest class of forgings required for marine machinery. The demand for Morison's Evaporator has shown such a marked increase that it was found necessary to make large extensions in the department devoted to their manufacture, and these alterations are now being carried out. The local shipyards still have a fair show of work, and there are also some repair contracts being carried out in the port.

**Stockton.**—At Messrs. Blair & Co's Works, where business is fairly good, a dispute with the fitters is pending in reference to the overtime question, and we believe that other works in the locality are likely to be involved. In counting overtime the men want each day to stand by itself, so that overtime rates shall be claimable after 5 p.m. (the usual stopping time) even when they have only worked a half or a three-quarter day. The masters, on the other hand, decline to pay overtime rates until after 5½ hours, which constitute the full week's work, shall be to the claimant's credit in any one week. This is a plain statement of the case, and it requires no exceptional acumen to see that the men are greatly in the wrong. Efforts for a settlement of the dispute are now being made, and it is to be hoped they will be successful.

**Middlesbro'.**—Since last month shipbuilding prospects at this centre do not seem to have improved; but there is some repair work in hand, and further contracts in the same line are expected. Messrs. Westgarth & English continue to be fairly busy, among the contracts in hand being the engines for vessels which are being built by the Sunderland Shipbuilding Co., and Messrs. Wood & Skinner, Bill Quay-on-Tyne.

**Darlington.**—At the Darlington Forge Co's Works trade is still brisk, there being a good number of contracts for ship and engine forgings in hand, besides other work of importance.

## THE MERSEY.

(From our own Correspondent.)

**T**HE marine engineering and shipbuilding industries on the Liverpool side of the Mersey continue without improvement, and the position is much the same as reported last month. On the Birkenhead side, however, the position as regards shipbuilding is decidedly better, and a considerable amount of work is coming forward, both in Government orders and in other directions, which gives a much more healthy outlook to the future than has been the case for some time past. Messrs. Laird Bros. have just commenced one of the fleet of new twin-screw steamers which they are building for the City of Dublin Steam Packet Co., reference to which was made last month, and they have now got ready for launching the first of the 30-knot torpedo destroyers which they are building for Her Majesty's Government. This vessel, which is to be christened the *Quail*, is similar to the torpedo destroyers previously built by Messrs. Laird Bros., such as the *Banshee* but larger and more powerful in every respect.

With regard to the general engineering industries of the district, the position shows a steady, gradual improvement, and most branches are now getting fairly off for work, although it is still exceptional where they are not in want of orders to keep them actually fully employed, and no appreciably better prices can as yet be got on new business that is secured. Machine tool makers are all getting busier, and in some cases are now tolerably full of orders. Stationary engine builders continue well engaged. Boilermakers are better off than they

have been recently, and the general engineering industries of the district are all tending towards renewed activity. The usual monthly returns of the trades union societies bear evidence of the steady improvement that is going on in the engineering industries of the country, and there is a considerable decrease in the number of out-of-work members on their books. Of course the settlement of the disputes in the shipbuilding industry in North Lancashire and in Yorkshire has taken a number of members off the unemployed list, but independent of this a substantial reduction has taken place. The Amalgamated Society of Engineers has now only five per cent. of its total membership on the unemployed list, and in the Manchester district the out-of-work members number about the same percentage of the local membership. The Steam Engine Makers' Society's returns show only about 2½ per cent. of the total membership on donation benefit. With reference to the reports from districts as to the state of trade, the tone generally is hopeful, and although in the Liverpool district and in the principal Midland centres, trade shows no appreciable improvement; in the Manchester district and other centres throughout the country, with the above exceptions, there is a gradual movement towards a better state of things.

With reference to the new metallic packing, introduced by Messrs. Lancaster & Tonge, of Pendleton, of which we gave a notice recently, we may add that they have since been carrying out a number of experiments with a view of effecting further improvements, both in the composition of the metallic packings and the action of the spring by which they are controlled, and they are now supplying a considerable number of these new packings to various engineering firms and other works throughout the country, from whom they have received most satisfactory reports as to the efficiency and simplicity of the new "Lancaster" metallic packing. We need only repeat that this packing dispenses with the very small springs which are an objectionable feature in most other metallic packings, the smallest sizes of the Lancaster packing requiring only one, and the larger packings not more than two springs, which completely encircle the block and press the packings to the rod with a perfectly even pressure. The packing consists simply of two segmental rings of white metal which are encircled by a spring pressing them firmly to the rod. The white metal rings are divided into four segments, two of which are pressed to the rod, the remainder simply acting to keep the joint tight. In addition to keeping the packing tight on the rod, every possible variety of motion is allowed for in the event of the rod getting out of line, and this is provided by a ball joint and a slide plate, the packing being pressed tight against this by springs on the opposite side of the packing, and the whole of the packing is enclosed in a strong case which is perfectly steam-tight and secured in position by the gland stud.

Messrs. Atkinson & Leather, Ardwick, Manchester, have designed an improved lever saw, which is specially suitable for general engineers, machinists, boiler-makers, and also for use in marine engineering establishments, for cutting bars, tubes, &c., whilst it is also specially adapted for cutting the smaller sized sections of iron and steel used by bridge and iron roof builders. The machine consists of a cast-iron table or bed, mounted on feet to a convenient working height, T slots being provided for securing the work. The saw blade, which is 15 in. in diameter, is fitted on steel spindles with gun-metal worm wheel, worm, and steel shafts. The lever frame swings on dead centre bushes, having an adjustable feed when cutting thin metal, and fast and loose pulleys, water-pot and screw keys are provided with the machine. The saw will cut cold iron and steel, up to 4 in. round or square bars, or 9 in. by 4 in. angle, tee, channel or girder sections, and when once the work is set very little attention is required, the metal being fixed and cut in a much shorter time than would be occupied by a smith, whilst a square and clean finish is given to the section where it has been cut.

A number of special designs in yacht and launch engines are made by the Ardwick Engineering and Machine Co., Manchester. Amongst these are designs in compound surface-condensing engines, as fitted in the steam yacht *Esmeralda*, which are compact and substantial in design, and easy of access to the working parts. The condenser forms the base of the back columns, being cast in a piece with them. The air circulating, feed and bilge pumps are worked by rocking levers from the crosshead of the low-pressure engine. The reversing gear consists of link motion, and being of a size easily handled, is worked direct by a hand lever. The high-pressure cylinder is 7 in. diameter, low-pressure 12 in., and the stroke is 8 in. All

the parts are strongly proportioned, special attention being given to the introduction of large bearing surfaces.

In the iron trade here there has been a further strong upward move in prices during the past month, whilst a large weight of buying has been going on. With the close, there is, perhaps, a slight slackening off in the amount of business doing in pig-iron, but this could only be expected, and makers are now so well sold for two or three months forward that they are indifferent about booking further orders at present, and hold with firmness to their quoted rates. In pig-iron local makers are now quoting 45s. 6d., less 2½ for foundry qualities, delivered Manchester, whilst in district brands, prices have been advanced 1s. 6d. per ton upon last month's prices, Lincolnshire being now quoted 40s. 6d. to 41s. for forge, to 42s. 6d. and 43s. for foundry, with Derbyshire foundry 45s. 6d. to 48s., net cash delivered Manchester. Outside brands offering here have also shown a further upward move, Middlesbrough iron being 2s. per ton dearer than last month, good foundry qualities now not averaging under 47s. 4d. to 47s. 10d. net cash delivered Manchester, with Scotch iron quoted by makers at 50s. 6d. for Eglinton, and 53s. 6d. for Gartsherrie net prompt cash, delivered at the Lancashire ports, with practically little or nothing offering for immediate delivery. Merchants, however, are here and there prepared to take 1s. under makers' prices for iron which they hold, and which they bought before the upward move.

In the manufactured iron trade, business has been coming forward in increasing quantity, and there has been an advance of 2s. 6d. per ton in bars, which are not now quoted under 25 7s. 6d. to 25 10s. for Lancashire, and 25 10s. for North Staffordshire qualities, whilst prices for sheets are 5s. higher, good qualities averaging 27 10s. to 27 12s. 6d., with hoops firm at the Association list rates of 26 for random to 26 5s. for special cut lengths, delivered Manchester district, with 2s. 6d. less for shipment, whilst some moderate American orders for cotton tie hoops have been booked at an advance of 5s. upon recent minimum rates.

In the steel trade the position has shown a material improvement during the month. Hematites have been gradually hardening in price until good ordinary foundry qualities now average 57s. 6d. to 58s., less 2½; billets, however, remain at about 24 to 24 5s. net cash. In manufactured steel, boiler plates have shown a continued stiffening tendency, and 26 7s. 6d. to 26 10s. are now the average figures, with steel machine bars about 26 2s. 6d. to 26 5s. delivered in this district.

In the metal market a moderate business has been put through during the month, with prices for manufactured goods firm at list rates, which for delivery Manchester district are as under: solid drawn brass boiler tubes, 6½d.; brass surface-condenser tubes, 7½d.; copper tubes, 7½d.; brazed copper gas and steam tube, 7½d.; brazed brass gas tubes, 7d.; brass wire, 5½d.; copper wire, 6½d.; rolled brass, 5½d.; sheet brass, 6½d.; yellow metal condenser plates, 5½d. per lb.

The timber trade continues to improve, but values show no appreciable advance. Imports have been on a free scale, and deliveries fair, but stocks are ample. In East India teak both logs and planks continue to arrive in excess of the demand, and although there have been moderate deliveries the stock held over is large with prices unchanged and difficult to maintain. There has been no import of greenheart, and for this prices are unaltered.

No appreciable improvement is reported in the coal trade, and pits continue on short time with supplies plentiful. House coals meet with a rather better inquiry, but the actual business doing continues very limited in weight and prices show no hardening tendency. Steam and forge coals are in no better demand except that there is rather more doing for iron-making requirements. Generally supplies hang upon the market, and prices rule extremely low. Engine fuel has been in but slow demand during the month owing to the holidays at the works in the industrial districts, but as these are now over there is a fair demand for mill purposes. Supplies, however, are plentiful and prices unchanged. Best house coals average 10s. to 10s. 6d.; seconds, 8s. 6d. to 9s.; common house coal, 7s. to 7s. 6d.; and steam and forge coals, 6s. to 6s. 6d., with engine fuel 5s. and 8s. 6d. for common to 4s. 6d. and 5s. for better qualities at the pitmouth.

For shipment business continues only limited in weight, with no improvement in prices, ordinary steam coal not averaging more than 7s. 3d. to 7s. 6d. delivered Mersey ports.

## BELFAST TRADE NOTES.

(From our own Correspondent.)

**B**USINESS in the engineering and shipbuilding trades here has been disturbed considerably during this month by reports of a threatened strike for a general advance of wages. A rise of 2s. per week is asked by the men, which the masters do not seem at all disposed to grant. The respective notices expire on Wednesday, September 26th. The Belfast masters have combined with the Clyde shipbuilders, and there is some talk of a general lock-out. This would, indeed, be serious for Belfast at present. It is hoped, however, that better counsels will prevail and the dispute be amicably settled before matters reach such a crisis.

During this month six vessels have been launched in all, from the various Belfast shipyards, three of these by Messrs. Harland & Wolff, and three by Messrs. Workman, Clark & Co. The largest of these is the s.s. *Cestrian*, which was launched on September 21st from the Queen's Island, and which has been built to the order of Messrs. F. Leyland & Co., Limited, Liverpool. She is the third of the same class launched within this last month or two for this firm, and is intended for the same trade as the others, namely, cargo and cattle, between Boston, New York and Liverpool.

The second steamer from the same yard is named the *American*, and is owned by the West Indian and Pacific Co. She is of large size, and fitted with all the latest improvements.

The s.s. *Historian*, a large steamer for Messrs. T. & J. Harrison, of Liverpool, completes Messrs. Harland & Wolff's output up to the present for this month. She is for their Liverpool and Calcutta trade, and is slightly larger than the s.s. *Statesman*, built a short time ago by Messrs. Workman, Clark & Co. for the same owners, and which has since proved so successful.

Messrs. Workman, Clark & Co. launched in the beginning of the month the second of three vessels building for the China Mutual Steam Navigation Co. She is named the *Kintuck*, and is of the same size and tonnage as the s.s. *Pakling* (her sister ship), mentioned in last Notes. These steamers are being built to supply the demands of the ever-increasing China trade.

The *Pakling*, it may be mentioned in passing, left Glasgow on the 21st ult., on her maiden voyage.

On the 19th ult. this energetic and rising firm launched two other steamers, one of which, named the *Mourne*, is locally owned and is intended for the general carrying trade. She is of large size, and has been designed rather for economy than speed.

The other steamer, the *Centaur*, is to the order of Messrs. Alfred Holt & Co., Liverpool. She is comparatively small and is meant for up-river traffic on the China station. She is similar to several others which have been built by this firm for the same owners.

As regards repairs, the White Star steamer *Doric* is still in dry dock, where it is expected she will remain for some time.

The White Star *Oceanic*, still lies here also, and at present it is not decided whether her old engines and boilers will be removed or not.

The Pacific Co.'s steamer *Oroya* has been floated out of dry dock, and will leave for her station before the end of the month. She has had a new tail shaft fitted, also a spare one supplied. These, it should be mentioned, are very heavy shafts, each weighing about 24 tons. She has also had a new L.P. crank put in, the other having been found to be twisted. In addition a new propeller has been fitted and a large number of shell plating replaced.

The Union Co.'s Royal Mail steamer *Norman*, which arrived here last month, has taken the s.s. *Oroya's* place in the Alexandria Dock, to have damaged shell plating replaced, and other repairs effected. It has been found that the port tail shaft has been bent outside of the stern tube, and this shaft has been removed and will probably be replaced by a new one. Her repairs are being effected with the utmost despatch, and should the appending strike not intervene, she will leave shortly.

Several repairs of a minor order have also been executed throughout the month.

We understand that during the month an order has been placed with Messrs. Harland & Wolff, by the Hamburg-American Co., for a very large cargo and passenger steamer.

Another large stramer is also under consideration, at present for Messrs. F. Leyland & Co., Liverpool.

The engines of H.M. battleship *Hannibal*, are now in course of erection in Messrs. Harland & Wolff's engine works, and are being pushed on rapidly.

The s.s. *Victorian* and s.s. *Armenian*, mentioned in last month's Notes, have left this port for Liverpool during the present month.

Messrs. Victor Coates & Co., and Messrs. Combe, Barbour & Combe, are also fairly well supplied with orders, the latter firm being at present engaged on several triple-expansion engines of marine type for land work.

The smaller repair shops all complain more or less of slackness at present, but the tendency seems to be in the direction of more work.

We should add that a new shop has been in course of erection here, and is almost completed now. It is intended to deal with the larger class of repairs. The firm will be known as Messrs. McColl & Co., Limited, and will be managed by Mr. McColl, late of Messrs. Mollwaine and McColl.

Altogether the engineering trades are well employed here, and will be for some time to come.

## NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

**Barrow.**—There is not much change to note in the condition of the shipbuilding and engineering trades at Barrow. No new orders have been booked during the month, although it was reported that Mr. Cayzer, the member for Barrow, was in the market for four new Clan Line steamers. It is probable these orders will sooner or later be placed, as the Clan Line Co. are gradually developing a good South African trade and require new steamers to work it. Already three Clan liners have been built at Barrow, and two are in course of construction at present in the Barrow yard. The other work in hand at Barrow on the stocks, at any rate, apart from the two Clan liners, is the *Juno* and *Doris*, second class cruisers for the Admiralty. Much progress has been made in the construction of the former and arrangements are in progress for the launch in November. In all probability the *Doris* will also be launched before the end of the year. As to new work, prospects are not cheerful. There is very little demand for new mercantile tonnage, and in many cases the prices offered are so low that builders will not accept them because they know they will lead to a loss when completed. The Barrow Co. has received intimation that they will be asked to tender for one of the three first-class cruisers which the Admiralty is about to give out to private yards; but these orders will probably not be given out till the new year. The Chileans require a new cruiser, and the Barrow Co. is at work in the preliminaries of getting out a tender for the job. The last order the Chileans gave out should have come to Barrow, and perhaps, after the experience the Barrow Co. has recently had in the building of warships of the highest class the South American order may come to the West-Coast this time. There is some talk about Japanese and Chinese orders, but these are as yet in embryo, and it is not probable they will be heard of this year. At any rate, Barrow builders are open to compete for any, either home or foreign work, which may arise whether in warships or merchantmen, and it is evident they must have some new orders soon or their yard will be empty. The *Sturgeon* torpedo-boat destroyer is ready for delivery to the Admiralty, her sister ship the *Skate* will be delivered during October, and the third torpedo-boat destroyer *Starfish* has gone through some very satisfactory speed trials, and will be delivered to the Admiralty in November. It is thought highly probable that the Barrow Co. will receive an order from the Admiralty to build three of the new 30-knot torpedo-boat destroyers, as all the Government require in the present scheme have not been given out. In the engineering and boiler-making departments there is much activity at Barrow, and overtime is being worked. The recent strike resulted in a considerable stoppage of work, and this is now being rapidly made good. The engines for H.M.S. *Powerful* are nearly ready for going into the steamer, while those for the *Juno* and *Doris* are well forward. The Belleville boilers for the *Powerful* are being rapidly put together and several have been tested and officially accepted at high pressures of steam. There are 48 of these in the ship. The work on the dock or engineering side of the Barrow works will be very active shortly. When three cruisers are being fitted out at once the place will be lively.



**The Steel Material Trade.**—There is very little doing in this trade at present as builders covered themselves some time ago. But it is significant that the temporary closing of the Barrow Steel Works has resulted in all the orders for plates and shipbuilding sections generally going out of Barrow to the Clyde, the North of England and elsewhere. It is probable the steel works at Barrow will not start again this year.

**Hematite Pig-iron.**—This trade has been very erratic this month. There have been large sales at prices in many cases 7s. and 8s. per ton higher than in the previous month. There were some indications of a better trade, and speculators seeing this took advantage of the position and bought largely for stock. The consequence is, that stocks have increased 20,000 tons, prices have advanced to 51s. and receded to 49s. 6d., and three or four additional furnaces were put in blast.

**Mr. A. Blechynden,** the engineering manager of the Naval Construction and Armaments Co., has sent in his resignation, and will leave the service of the company before the end of the year with a brilliant record of good work done. In every instance the engines built by Mr. Blechynden for steamers built by the Barrow Co., and in engines built for H.M. ships, which have been constructed elsewhere, the greatest satisfaction has been given, and the guaranteed speeds have always been exceeded. It is with very general regret that Mr. Blechynden leaves Barrow. His successor has already been appointed in the person of Mr. James McKechnie, who has been for some five years manager of the engineering department of the Astilleros del Nervion at Bilbao. He will enter on his duties in November. Mr. McKechnie possesses especially high qualifications for the post. The works at which he has been employed on the Clyde are David Rowan's; Stewart's, in the East End; Mirrless, Watson & Yarnan, before it passed under its present copartnership, besides other general engineering works. He was a draughtsman and chief pattern-maker at Clydebank when the earlier greyhounds were built, and went for a short time to Fairfield as chief draughtsman when the *Oregon* was built, but returned to Clydebank as assistant manager. He was there when the *America* was completed, and continued under Mr. Dunlop for several years, when, as now, splendid work, naval and mercantile, was being done. He went to Bilbao on the invitation of Sir Charles Palmer, and organised work for the construction of machinery for three cruisers. These have now been completed, and the splendid results got on the steam trials probably encouraged the Barrow people in their choice.

## Miscellaneous.

**Royal Visit to the Docks.**—On Friday afternoon September 15th, the Duchess of Albany and her two children, accompanied by a lady and gentlemen in waiting, visited the Royal Albert Docks under the escort of Sir E. B. Dawes and Mr. Williams, of the London and India Dock Co. After viewing the Docks the party lunched on board the s.s. *Golconda*, one of the most favourite passenger steamers of the British India Co. The distinguished visitors spent some time examining the ship, engine-room, and machinery.

**Delaware Hard Fibre Co.**—The following appears in the *Electrical World* of New York, August 24th:—"A flourishing business is reported by the Delaware Hard Fibre Co., Wilmington, Delaware, necessitating the operation of the works day and night, notwithstanding the fact that the size of plant has been doubled. The company has secured the contract for furnishing the General Electric Co., U.S.A., with fibre, and this work alone is sufficient to give employment to quite a large number of hands." This is supplemented by a report from Mr. Burns, to whom the company has entrusted the management of its business in all parts, except the North American Continent, who states that the progress of business during 1895 shows a gratifying and unexpected increase over 1894.

**King's College, London.**—We have been favoured with a copy of the syllabus of the Architectural Department of this College for the ensuing session, October 3rd to December 18th, under the direction of Professor Banister Fletcher, F.R.I.B.A. To place the course within the reach of all students both day and evening classes will be held, the Reference Museums and Library in connection therewith being open to all. Further particulars may be obtained from Professor Fletcher, at the College, or at his offices, 29, New Bridge Street, London, E.C.

**Launch of a New Steam Lifeboat.**—Messrs. J. T. Thornycroft launched last month a new hydraulic steam lifeboat, named *President Van Heel*, which is an improved *Duke of Northumberland*, built by the same firm. The new boat is 55 ft. long and has a beam of 16 ft. Her hull has been designed by Mr. G. L. Watson, the naval architect of the Royal National Lifeboat Institution, and the machinery by Messrs. Thornycroft. She has been built to the order of the South Holland Lifeboat Institution, and her launch was attended by Admiral Sir W. Dowell and Captain Nepean on behalf of the Royal National Lifeboat Institution, and by Mr. Debruijue and Mr. Croll for the similar institution in South Holland.

**Shipbuilding Trade.**—From the monthly report of the United Society of Boilermakers and Iron Shipbuilders, it appears that the unemployed, supernumerary, and sick members on the books number 6,190. This shows an increase of 74 on the sick fund during the past month. The percentage of unemployed is much about the same as last month—11'6. The shipbuilding trade reports show depression in the Tees district, but better prospects in Scotland and on the Mersey. The Tees report says: "We regret in sending you this report that trade is not in a very prosperous state in the Tees and Hartlepool districts. Shipbuilding has not yet fully recovered from the injurious effects of the disastrous struggle between kindred trades and the employers of last year. Employers complain of scarcity of orders. Keen competition and low prices now ruling, estimates have to be pared down to very fine proportions, and the margin for profit has vanished—so they state." The report for Scotland says the shipbuilding industry continues fairly busy, and the prospects for the autumn and winter months are encouraging. The work on hand and in builders' books is estimated at 262,000 tons, compared with 285,000 tons at the same date last year. The report from the Mersey district says prospects are brighter.

**A First Engineer Rewarded.**—There was presented on September 25th, by the Mayor of Southampton, in the presence of the Town Council, the silver medal and certificate of the Royal Humane Society to Mr. James Slater, first engineer of the Union Co.'s steamer *Union*. The deed for which the reward was given was performed on September 1st, 1894, when the *Union* grounded on Chinde bar, seven miles from the shore, opposite to the Zambesi. There was but one boat, and when the vessel struck the captain sent part of the crew ashore for assistance. After the departure of the boat, the vessel settled down, and those who were left on the ship climbed on to the funnel. Mr. Slater got hold of two men, one Mr. Scott, a passenger, and the other the mate, neither of whom could swim. He stood by them until the ship was sinking, and then pushed them off and swam with them, after having first ascertained that the other men could swim. Mr. Slater swam with the men through the heavy sea for seven miles before they were picked up by a rowing boat, about 200 yards from the shore, after having been in the water four hours. Mr. Scott was insensible for the last hour and a half, but recovered when taken on shore. The water swarmed with sharks. Mr. Slater, who was heartily congratulated by the Mayor and members of the corporation, replied that he had only done what was right and what any other Englishman would have done.

**Hull Steam Trawlers.**—To the Hull Fishing Fleet has just been added a very fine trawler. It is the first vessel built to the order of a new company, Messrs. E. J. Williams & Co., a company composed chiefly of Hull fish merchants, and constructed by Messrs. Cochrane & Cooper, of Beverley, from the model of Mr. C. D. Holmes. The dimensions are:—Length between perpendiculars, 108 ft. 2 in.; over all, 116 ft.; beam, 21 ft.; depth of hold, 11 ft. The vessel is fitted with 60 H.P. triple-expansion engines, with extra large boilers, by Messrs. C. D. Holmes & Co., Hull. The vessel is being fitted throughout with all the latest improvements of note, and, when completed—in addition to being the largest trawler hailing from Hull—will be one of the best ever seen in Hull waters. That was the opinion expressed by experts when the vessel was launched on the morning of September 23rd. The trawler was named the *Campania* by Mrs. E. J. Williams. The ceremony was witnessed by a very large company, in glorious weather, amongst those present being Mr. Williams, Mr. and Mrs. J. A. Smith, Mr. and Mrs. Willey, Messrs. Percy, Willey, Smith, and Cochrane; Messrs. Cochrane & Cooper, Captain and Messrs. Just, Messrs. Armitage, W. R. Wilson, J. W. Whitlam, J. Watson (superintendent engineer), Hobbs Brothers, Crawford, and Garforth.

## LAUNCHES AND TRIAL TRIPS.

## LAUNCHES—ENGLISH.

**Drumelzier.**—On August 15th was launched the steel screw steamer *Drumelzier*, designed by Messrs. James Laing, of Sunderland, built to the order of Messrs. Gillison & Chalwick, of Liverpool, and under the superintendence of Messrs. Flannery & Blakiston, of Liverpool and London, for general cargo purposes. The vessel is 353 ft. long, over all, 44 ft. 9 in. beam, and 28 ft. 11½ in. depth, moulded to spar deck and classed 100 A1 at Lloyd's, under special survey, and will carry 5,590 tons of cargo, fuel and stores, on 22 ft. 10½ in. draught. The vessel is of the spar deck type, and fitted with top-gallant fore-castle, bridge house to enclose engines and boilers, and short poop. The water ballast is on the cellular system. The accommodation for captain, officers and engineers is fitted up on the top of and under the bridge deck, and for the crew under the poop. The machinery is of triple-expansion type, cylinders being 24½ in., 40 in., 66 in. diameter, and a stroke of 45 in., supplied with steam of 160 lbs. from two boilers, 10 ft. 6 in. long, and 15 ft. 6 in. diameter. The arrangements for working the cargo, which include five steam winches, are exceptionally complete.

**Leonora.**—On August 19th a steel schooner-rigged steamer named *Leonora*, of 2,570 tons, was launched at Thornaby-on-Tees; owned by Ide Poorter, Rotterdam.

**Ariagne.**—On August 19th an iron steam ketch, of about 149 tons, was launched at Hull; owners, C. Hellyer & Co., Limited, of Hull.

**Cento.**—On August 20th a steel schooner-rigged steamer, of about 2,160 tons, was launched at Sunderland; owners, R. Nicholson & Sons, of Liverpool.

**Adra.**—On August 24th there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, West Docks, South Shields, a screw steamer built to the order of the English and American Shipping Co., Limited, of which the managers are Messrs. C. T. Bowring & Co., London. Her dimensions are as follows:—Length, 303 ft.; breadth, 42 ft.; depth, 22 ft. 7 in. The vessel has a carrying capacity of 4,300 tons dead-weight. Her engines, also built by Messrs. John Readhead & Sons, are of the triple-expansion type, having cylinders 28 in., 87½ in. and 61½ in. by 42 in. stroke, working at a pressure of 160 lbs., steam being supplied by two large steel boilers. The vessel is classed 100 A1 at Lloyd's. She was named the *Adra*, and is intended for general cargo trade. This is the fifth vessel built for the above company for Messrs. John Readhead & Sons.

**Ontario.**—On August 26th Messrs. Cochrane & Cooper launched from their yard at Beverley the *Ontario*, a fine steam fleet, built to the order of the Hull Steam Fishing and Ice Co. Her principal dimensions are:—Length between perpendiculars, 95 ft.; breadth, 30 ft. 6 in.; depth, 11 ft. There are ballast tanks forward, and the vessel will carry about 120 tons of coal, which will enable her to remain at sea seven or eight weeks. She will be fitted with 35 H.P. engines by Messrs. Amos & Smith. The launching ceremony was performed on Saturday, August 24th, by Miss May Strachan, granddaughter of Alderman Tooze, vice-chairman of the owning company, but owing to an unavoidable circumstance the *Ontario* refused to leave the ways. On August 26th no difficulty was experienced, the *Ontario* taking the water beautifully. Afterwards one or two congratulatory speeches were delivered in the office. Mr. Cochrane presided, and amongst those present were Mr. Cooper, Alderman Tooze, Mr. Beath, and Mr. J. Frost. The chairman proposed "The Owners." He said the vessel they had launched that morning was, he believed, the thirteenth they had already launched for the Hull Steam Fishing and Ice Co., and there were two others in hand. The vessels had been, he believed, pretty successful, and he hoped the *Ontario* would be no exception to the rule. A good many prophecies had been made in connection with the fishing industry, one being that, owing to the patent gear, no more steam trawlers would be required. Of course, his firm sincerely trusted the prophecies would be wrong, and personally he had no fear of the future. Although the new gear was catching more fish, he was of opinion that new markets would be opened out and a good demand for fish maintained. Alderman Tooze acknowledged the toast. He quite agreed with the remarks of Mr. Cochrane

for this reason, that he happened to go to sea in 1838. Ever since that time people had said, "The fishing business is going to be overdone next year," and yet they had gone on. He served his time at Tor Bay, then he went to Ramsgate, and subsequently came to Hull. Each place had the same complaint, but the fact remained that owners kept renewing and renewing, and were always bringing forward fresh schemes and fresh classes of vessels. They could not deplete the sea, and he believed there would always be a living for steam trawlers. He had scarcely ever known at this time of the year so much fish landed as there had been within the last few days, and even that morning many thousands of boxes had been brought to Hull. He congratulated the owners on being able to launch such a fine model as the *Ontario*, and he hoped Messrs. Cochrane & Cooper would receive continuous orders, and give as much satisfaction in the future as they had done in the past.

**Glenroy.**—On Monday, September 2nd, there was launched from the Cleveland Dockyard of Sir Raylton Dixon & Co., Middlesbrough, an iron steam trawler, of the following dimensions:—Length, 100 ft. 8 in.; beam, 20 ft. 5 in.; depth, moulded, 11 ft. 8 in., which has been built to the order of Messrs. Ellis & Johnson, of Grimsby. She is of the well-known type of steam fishing vessels, of which a large number have been built by Sir Raylton Dixon & Co. Triple-expansion engines will be fitted by the North-Eastern Marine Engineering Co., Limited, of Sunderland, the cylinders being 11 in., 17 in., and 28 in., by 21 in. stroke, with a large steel boiler, working at 160 lbs. pressure. As the steamer was leaving the ways she was named *Glenroy*.

**Palawan.**—On September 4th Messrs. Caird & Co., shipbuilders and engineers, launched the steel screw steamer *Palawan* for the Peninsular and Oriental Steam Navigation Co., her principal dimensions being:—Length, 400 ft.; breadth, 46 ft. 6 in.; and depth, 31 ft.; with a deadweight carrying capacity of 6,000 tons. In design and arrangement she is similar to the *Sunda*, which attracted much attention while she was being fitted out for sea at the Victoria Harbour for the P. & O. Co. The *Palawan*, which has superior accommodation for 50 first saloon and 25 second saloon passengers, is elegantly fitted up, with saloons, music-room, smoking-room, &c. She is also furnished with all the most modern appliances for the rapid loading and discharging of cargo. Her engines, of 3,000 effective H.P., are of the triple-expansion type, and, with the vessel fully laden, are capable of propelling her at 12 knots. On leaving the ways the new vessel was gracefully christened *Palawan* by Mrs. James Glen. The *Palawan*, which took the water in fine style, was subsequently towed by two of the Glasgow and Greenock Shipping Co.'s tugs to the Victoria Harbour, where her engines and machinery will be put on board. She is the fourth steamer which Messrs. Caird & Co. have built for the P. & O. Co. since the beginning of the present year. Messrs. Caird & Co. have now on the stocks a large P. & O. steamer (the *India*) of about 8,000 tons. As showing the long connection of the P. & O. Co. with Greenock, it may be stated that since 1846 the Messrs. Caird have built for the company the large number of 46 steamers, aggregating 203,328 tons.

**Dilward.**—On September 4th a steel steam ketch of about 149 tons, named the *Dilward*, was launched at South Shields, owned by the United Steamtug Co., of Gravesend.

**Northumberland.**—On September 4th there was successfully launched from the shipbuilding yard of Messrs. Wood, Skinner & Co., at Bill Quay, an iron paddle steam ferry boat, which has been built to the order of the River Tyne Commissioners for the vehicle and passenger traffic between North and South Shields. As compared with the Commissioners' other vessels of this class, the new vessel is larger, and capable of carrying an additional number of animals and vehicles as well as passengers. Its principal dimensions are as follow:—Length between perpendiculars, 110 ft.; extreme breadth, 43 ft.; depth moulded, 9 ft. 6 in. The engine-house and deck cabins are forward of the vehicle deck, and the cabins are approached by a passage on either side in the way of the paddle cases. The motive power consists of a set of surface-condensing side-lever engines, having cylinders 30 in. diameter, with 4 ft. piston stroke, which will be supplied and fitted by Messrs. Baird & Barnsley, of North Shields. Steam is supplied from two steel cylindrical multitubular boilers, each 7 ft. 9 in. diameter and

17½ ft. long, which have been made by Messrs. J. T. Eltringham & Co., of South Shields. During construction the vessel has been superintended by Mr. Philip J. Messent, the Commissioners' engineer, and his assistants. The act of christening was performed by Miss Cay, daughter of the chairman of the Ferries Committee, who named the vessel the *Northumberland*.

**On Sang.**—On Thursday, September 5th, there was launched from the Cleveland Dockyard of Sir Raylton Dixon & Co., Middlesbrough, a fine spar-decked steel screw steamer which has been built to the order of Messrs. the Indo-China Steam Navigation Co., Limited, 26, Cornhill, London, for their Eastern trade. Her principal dimensions are:—Length, 322 ft. 6 in.; beam, 40 ft. 6 in.; depth, moulded, 27 ft. 11 in.; and the deadweight carrying capacity will be about 4,700 tons; the main deck is of steel, spar deck of iron, and the poop, bridge, and forecabin decks are of teak. Handsome accommodation is fitted up under the bridge for the captain, officers, and engineers, and the crew and firemen are berthed under the topgallant forecabin. Engines will be fitted by the North Eastern Marine Engineering Co., Limited, Sunderland, the diameter of the cylinders being 23 in., 36 in., and 59 in. by 42 in. stroke, with two extra-large steel boilers, working at 160 lbs. pressure per square inch. The construction of the steamer and engines has been carried out under the supervision of Mr. Buchanan, of Shanghai, chief superintendent for the Indo-China Steam Navigation Co., Limited, and Mr. Duncan. As the steamer left the ways she was named *On Sang* by Miss E. Herbert, of Middlesbrough. Sir Raylton Dixon & Co. are also building two other steamers for the same owners.

**Dunottar.**—On September 5th Messrs. Ropner & Son, Stockton-on-Tees, launched a steel screw steamer of the following dimensions, viz.:—Length between perpendiculars, 830 ft.; breadth extreme, 45 ft.; depth moulded, 28 ft. 10½ in. The steamer has been built to the order of a Glasgow firm, and is of the spar-decked rule with poop, bridge, and topgallant forecabin. The saloon and cabins for captain and officers will be fitted up in the poop, and the accommodation for engineers will be provided under the bridge deck amidships, the crew being berthed in the forecabin as usual. She has double bottom on the cellular principle for water ballast, and has been designed to carry a deadweight cargo of over 5,500 tons on Lloyd's summer freeboard. She will have all the most recent appliances for the expeditious and economical loading and unloading of cargo, and will be fitted with a set of powerful triple-expansion engines by Messrs. Blair & Co., Limited. Mrs. Macbeth, of Glasgow, named her *Dunottar*.

**W. D. Cruddas.**—On Thursday, September 5th, there was launched from the yard of the Tyne Iron Shipbuilding Co., of Wellington Quay-on-Tyne, a steel screw steamer of the following dimensions, viz.:—Length, 306 ft.; breadth, 42 ft.; depth, 21 ft. 4 in., moulded, and to class 100 A1 at Lloyd's on the partial awning-deck rule. The vessel has water ballast fitted right fore and aft on the cellular system, and is also fitted with all modern improvements for the rapid loading and discharging of cargo, including four double-cylindrical steam winches, direct-acting steam windlass, large donkey boiler, steam steering gear by Messrs. Donkin & Co., of Newcastle, and Hastie's screw gear aft. The engines, which are to be supplied by the Wallsend Slipway and Engineering Co., are of the triple-expansion type, having cylinders 23 in., 38 in., and 62 in. by 42-in. stroke, and working at a pressure of 160 lbs. The vessel was named the *W. D. Cruddas*.

**Bermuda.**—On September 5th Messrs. Cochrane & Cooper launched from their yard, at Grovehill, Beverley, a new steam fleet of the following dimensions:—98 ft. by 20 ft. 6 in. by 11 ft., which has been built to the order of the Hull Steam Fishing and Ice Co., Limited. The vessel will be fitted with 85 H.P. triple-expansion engines by Messrs. Amos & Smith, Hull, also with all the latest improvements, including the new Otter trawl gear. As the vessel dropped off the ways she was christened the *Bermuda* by Miss Amelia Wainwright.

**Guillermo Lopez.**—On Friday, September 6th, there was launched from the Cleveland Dockyard of Sir Raylton Dixon & Co., Middlesbrough, a steel twin-screw tug which has been built to the order of owners in Habana through Messrs. Hawkes, Somerville & Co., of Liverpool. Her principal dimensions are:—Length, 140 ft. 6 in.; breadth, 26 ft.; depth moulded, 11 ft. The vessel has been built under Lloyd's special survey for their highest class, and is specially designed

for passenger and towing purposes in the West Indies. Handsome accommodation is provided in bridge-house for 16 first-class passengers; the captain's room and state-room are in teak house on bridge deck and the officers and engineers are berthed aft. The crew and firemen are also berthed aft in well ventilated, comfortable quarters. All exposed decks are of teak. A shade deck is fitted over engine and boiler space with awnings all fore and aft. Water ballast in cellular bottom. A steam steering gear is fitted up amidships and steam windlass forward. The vessel is fitted with twin-screw engines by Westgarth, English & Co., and is designed for a speed of 12 to 13 knots an hour. On leaving the ways she was named *Guillermo Lopez*.

**King David.**—On September 6th Messrs. Short Brothers launched from their shipbuilding yard at Pallion a handsomely-modelled steel screw steamer, built to the order of the King Line of Steamers, Limited. The dimensions are:—Length, 304 ft.; breadth, 44 ft.; and depth, moulded, 23 ft. 2 in. The vessel, which has been constructed under special survey to the highest class in Lloyd's Register, has been specially designed for the carrying of a large cargo on a shallow draught of water, while care has been taken to minimise obstruction in the hold by substituting deep framing and strong side stringers, with wide-spaced beams, in lieu of a second deck or tier of beams. There are five powerful steam winches on deck for loading and discharging, steam being supplied by an extra large donkey boiler. The steam steering gear, which is worked from a house on the pilot-bridge, has been placed on the engine-room platform, and is of the latest design. Screw gear fitted aft, and a powerful steam windlass on the forecabin. The vessel is constructed on the cellular double-bottom principle, divided into trimming tanks for water ballast, and has a full poop for the accommodation of captain and officers. On leaving the ways the vessel was named *King David* by Mrs. Gideon Pott.

**Penelope.**—On September 7th an iron steam ketch of about 149 tons, named the *Penelope*, was launched at Hull, owned by C. Hellyer & Co., Limited, of Hull.

**Vancouver.**—On September 7th an iron steam ketch, of about 140 tons, named the *Vancouver*, was launched at Beverley, owned by the Hull Steam Fishing and Ice Co., of Hull.

**Hanseat.**—On Saturday, September 7th, there was launched from the East yard of Messrs. C. S. Swan & Hunter, shipbuilders, of Wallsend-on-Tyne, a large cargo steamer, which has been built to the order of Messrs. J. L. Mowinkel & Son, Bergen, and is one of the largest Norwegian-owned steamers afloat. The vessel in question is 342 ft. long, over all, by 44 ft. beam, by 29 ft. 10 in. moulded depth. She is built to the highest class at Lloyd's, under special survey, and has been designed for carrying a deadweight cargo of about 5,500 tons on a moderate draught. Immediately after the launch of the vessel, she was towed down to the North Eastern Marine Engineering Co.'s Works, where she will be fitted with their latest design of triple-expansion engines of large power. During the construction the steamer has been superintended on behalf of the owners by Messrs. E. F. Wailles & Co., of Newcastle, as well as Captain Hamre, who will take command on completion. On leaving the ways, the steamer was named the *Hanseat* by Mrs. Hamre, the wife of Captain Hamre. After the launch the company adjourned to the model room of the shipbuilders, where light refreshments were partaken of and the usual toasts honoured. The *s.s. Hanseat* has the distinction of being the first steamer built under the new sheds recently erected by Messrs. C. S. Swan & Hunter.

**G. B. Crow.**—On September 7th there was launched from the shipbuilding yard of the Naval Construction and Armaments Co., Limited, Barrow-in-Furness, a large twin-screw hopper and sand pump dredger, named *G. B. Crow*. This vessel has been built to the order of the Mersey Docks and Harbour Board, Liverpool. She is a sister ship to the *Brancher*, also built by the Naval Construction and Armaments Co., Limited, for the Mersey Board. The *G. B. Crow*, which is built of steel to Lloyd's highest class, is 320 ft. in over-all length, 46 ft. 10 in. moulded breadth, and 20 ft. 6 in. moulded depth. The boilers and propelling engines are at the aft end of the vessel, the pumping machinery at the fore end, and the sand hoppers amidships. The propelling machinery consists of two sets of triple-expansion engines, working separate screwshafts. The boilers, which supply steam for the pumping engines as well as the propelling engines, are constructed for a working pressure

of 180 lbs., the speed of the vessel, fully loaded, being 10 knots. The pumping machinery consists of two centrifugal pumps, each having 36-in. suction and delivery pipes, and each worked by a separate triple-expansion engine. The ceremony of naming the vessel was gracefully performed by Mrs. Bushell.

**Chirket-i-Hairie.**—On September 9th Messrs. R. & H. Green, Limited, launched from their yard at Blackwall a steel paddle steamer, 165 ft. by 21 ft. by 9 ft., for the Chirket-i-Hairie, of Constantinople. The engines are of 500 I.H.P., by Messrs. John Penn & Sons, Limited, of Greenwich. A sister boat will be launched in a fortnight's time, making the ninth vessel built at Blackwall yard for this company.

**Dielembre.**—On September 17th this turret-deck steamer was launched from the yard of Messrs. William Doxford & Sons, Limited, of Sunderland, having been built to the order of Messrs. the Compania Bilbania de Navigacion, Bilbao, and has received the highest class in both the British Corporation and Bureau Veritas registries. The christening ceremony was gracefully performed by Mrs. Robt. Doxford, of Silksworth Hall.

**Saint Ronald.**—On Wednesday, September 18th, Messrs. Wm. Gray & Co., Limited, launched a large steel screw steamer, which has been built to the order of Messrs. Rankin, Gilmore & Co., of Liverpool. She will take Lloyd's highest class, and is of the following dimensions, viz.:—Length, overall, 336 ft.; breadth, 47 ft.; depth, 24 ft. 10 in., with long bridge and topgallant forecabin. A handsome saloon and state rooms, together with the captain's room, will be fitted up amidships, the engineers' accommodation also amidships, and the crew's berths forward. The hull is built with web frames and a cellular double bottom for water ballast, large hatchways are fitted, powerful steam winches, patent steam steering gear amidships, and hand screw gear aft. Two donkey boilers, stockless anchors, and iron centre bulkhead to prevent shifting of cargo. Two iron masts, with fore-and-aft rig, and a complete outfit will be fitted for a first-class cargo boat. First-class triple-expansion engines are being supplied by the Central Marine Engine Works of Messrs. Wm. Gray & Co., Limited, having cylinders 24 in., 38 in., and 64 in. diameter, with a piston stroke of 42 in., and fine large steel boilers with a working pressure of 160 lbs. per square inch. The vessel and machinery have been constructed under the superintendence of Captain Davey and Mr. Reid, of the owners' staff, and the ceremony of naming the vessel *Saint Ronald* was gracefully performed by Mrs. Harrison, wife of Mr. Harrison, manager for Messrs. Rankin, Gilmore & Co.

**H.M.S. Haughty.**—On September 18th there was launched from the shipbuilding yard of Messrs. Doxford & Sons, Pallion, H.M.S. *Haughty*, which has been built by that firm to the order of the English Government. The vessel, which is a first-class torpedo-boat destroyer, is of the usual design, and is provided with engines capable of propelling her through the water at a rate bordering upon 80 miles an hour. She has been constructed under the supervision of the Government surveyors, and elaborately fitted with all the latest naval appliances. Her dimensions are:—Length, 196 ft.; breadth, 19 ft.; and depth, 12 ft. 6 in. She will carry a crew of 50 hands, all told, and will be armed with one 12-pounder quick-firing gun and five 6 pounders. She has two sets of engines, which have a combined strength of 4,000 H.P. Upon leaving the ways the christening ceremony was gracefully performed by Miss Greta Doxford, daughter of Mr. W. T. Doxford, M.P. After the launch the company adjourned to the builders' offices, where Mr. W. T. Doxford, M.P., in proposing the toast of "Success to H.M.S. *Haughty*," said that he hoped the vessel would give such satisfaction to the authorities as to cause them to send on an order for half-a-dozen others.

**Nordkyn.**—On September 19th Messrs. Ropner & Son, of Stockton-on-Tees, launched a fine steel screw steamer, the dimensions of which are as follow:—Length, between perpendiculars, 825 ft.; breadth, extreme, 43 ft.; depth, moulded, 26 ft. 3 in. She has been built to the order of a Norwegian firm. The vessel is built off the spar-decked rule, and has hood aft, bridge, and topgallant forecabin. The saloons and cabins for captain and officers will be fitted up under the bridge amidships, where also the accommodation for engineers will be provided; the crew being berthed in the forecabin as usual. She has a double bottom on the cellular principle for water ballast, and has been designed to carry a deadweight cargo of 5,050 tons on Lloyd's summer freeboard. The vessel will have

all the most recent appliances for the expeditious and economical loading and unloading of cargoes: has direct steam windlass, steam steering gear amidships, with powerful screw gear aft; four large steam winches worked by a large multitubular donkey boiler, stockless anchors, &c. She will be classed both at Lloyd's and Norwegian Veritas. The steamer will be fitted with a set of Blair & Co.'s triple-expansion engines, having cylinders 28 in. by 39 in. and 64 in. by 42 in., steam being supplied by two large steel boilers working at a pressure of 160 lbs., and all the most recent gearing suitable for a first-class cargo vessel will be provided. This is a sister ship to the s.s. *Blaamanden*, recently built for the same port, and is the twelfth steamer launched from the yard this year. The christening ceremony was gracefully performed by Mrs. Robert Ropner, junr., who gave her the name of *Nordkyn*.

**Charles Gaselee.**—On Friday afternoon, September 20th, there was launched from the shipbuilding yard of Messrs. W. Harkess & Son, of Middlesbro, a large steel hopper barge for London owners, which is intended to work on the Thames and South Coast ports. The principal dimensions are—150 ft. by 33 ft. 6 in. by 11 ft. 6 in. deep. The hopper doors, 16 in number, are worked from a centre girder running fore and aft over the hopper, and extremely large quadruple winches at each end, chains being led over large iron sheaves. The barge is fitted with a lowering mast and sails, and has bulwarks at each end. On leaving the ways she was named *Charles Gaselee*. The builders have a sister vessel building for the same owners and now nearly completed.

**Pontos.**—On Saturday, September 21st, Messrs. Richardson, Duck & Co. launched from their building yard a steel screw steamer of the following dimensions:—Length, over all, 309 ft.; breadth, extreme, 42 ft.; depth, moulded, 27 ft. 6 in.; tonnage, gross, about 2,780 tons. The vessel has been built under special survey, and will take Lloyd's 100 A1 class. She is of the complete awning deck type, with a large deck-house forward of engine casing, in which accommodation is provided for 12 passengers, an upper deck-house being fitted for captain and chart room. The officers and engineers are berthed on each side of engine casing. The vessel has a cellular double bottom all fore and aft, which, together with the after peak, is arranged for water ballast. She will be schooner-rigged, and her equipment includes 4 large steam winches, steam steering gear, stockless anchors, direct steam windlass, and all the latest appliances to facilitate loading, discharging and manœuvring. Her engines are by Messrs. Blair & Co., cylinders 22½ in., 37 in. and 61 in. by 42 in. stroke, with two large single-ended boilers working at 160 lbs. pressure. The vessel has been built to the order of Messrs. A. C. de Freitas & Co., of Hamburg, for their South Brazil trade. She has been superintended by Mr. Heintz Wiengreen, the owner's surveyor, of Hamburg, and Capt. Cantieni, who will take command, is supervising the fitting out. As she left the ways she was christened *Pontos* by Mrs. Spence, of Hartburn.

**Favell.**—The *Favell*, a new steel barque built by Messrs. Charles Hill & Sons, has been successfully launched from the Albion Dockyard, Hotwells. Her dimensions are:—Length, 237 ft. 5 in.; breadth, 36 ft. 5 in.; depth, 21 ft. 6 in.; and her registered tonnage is 1,343 tons. She has a raised quarter-deck, and an iron house on the main deck for the accommodation of the crew. As the vessel left the dock she was christened by Miss Favell Hill, whose name she bears.

**Rajah.**—A handy little screw tug has been recently launched from the yard of Earle's Shipbuilding and Engineering Co. Limited, Hull. She has been built to the order of Messrs. W. Cory & Son, of London. The christening ceremony was performed by Miss Hilda Mason, the daughter of the secretary of Earle's Co. The *Rajah* is built of steel, and is 68 ft. 6 in. long, 15 ft. broad, and 8 ft. 6 in. in depth to top of keel. Her machinery consists of a powerful set of compound engines, and a steel boiler of sufficient size to give a plentiful supply of steam.

**Boats.**—Messrs. Vosper & Co., yacht, tug and launch builders, Portsmouth, have just completed a 16 ft. boat, 3 ft. 10 in. beam, which they have fitted with one of their 1-brake H.P. oil engines, for Mr. J. T. Stephens, of Bridport, Dorset. They have also built and supplied Capt. K. R. Balfour, of Branksea Island, Poole, Dorset, with a 22 ft. elm-built boat, 5 ft. beam, and fitted with a 2½-brake H.P. oil engine. This boat was delivered by water. When crossing from Yarmouth, I.W., to Poole she was caught in a heavy sou'-westerly gale, and

eventually had to run back to Yarmouth. This is a very severe test, to show that the oil engines work equally as well in rough weather as in smooth water. The engine was running from 11 o'clock in the morning till 7.30 in the evening without a stop.

#### LAUNCHES—SCOTCH.

**Cargo Boat.**—On August 23rd there was launched from Messrs. Russell & Co.'s Kingston yard, Port-Glasgow, one of the largest cargo-carriers ever built at Port-Glasgow, her carrying capacity being 7,100 tons, the net register 3,050 tons, and the gross register 4,640 tons. The dimensions are:—Length, 382 ft.; breadth, 47 ft.; depth, 31 ft. 7 in. This vessel will be supplied by Messrs. Dunsmuir & Jackson, Glasgow, with triple-expansion engines. The owners are Messrs. G. M. Steeves & Co., Liverpool, for whom Messrs. Russell & Co. have built numerous steamers and sailing vessels. On leaving the ways the ceremony of naming the vessel was gracefully performed by Miss Lade, daughter of the late Mr. Alexander Lade, Port-Glasgow.

**Hernan Cortes.**—On August 24th Messrs. J. & G. Thomson, Limited, launched the gunboat *Hernan Cortes*, for the Spanish Government. The vessel is of interest as being the first of seven which are building with the express purpose of dealing with the Cuban insurrection. The builders have undertaken to deliver the vessels in an exceptionally short period. The contract for the vessels was signed in the second week in July, but owing to the intervention of the Fair holidays the keel of the *Hernan Cortes* could not be laid till the 22nd of the month, so that the actual construction of the vessel up to date has required only thirty working days. The *Hernan Cortes* is of 800 tons measurement, and has been constructed under the supervision of Lieut. Cervera. The vessel was launched with boiler, funnel, and masts on board.

**Ava.**—On August 26th Messrs. William Denny & Bros. launched from the Leven Shipyard, Dumbarton, a steel screw steamship of the following dimensions:—360 ft. by 43 ft. by 30 ft. The *Ava* has been built for Messrs. Patrick Henderson & Co., and will be engaged in their Glasgow and Rangoon trade. She has been built exclusively to the highest class of the British Corporation. Triple-expansion inverted cylinder engines will be supplied by Messrs. Denny & Co., Dumbarton, and the builders' electrical department will fit up an installation of the electric light. On leaving the ways she was christened the *Ava* by Miss Foulton.

**Glydesdale.**—On August 27th Messrs. Russell & Co. launched, at Port-Glasgow, a three-masted steel barque of 1,640 tons register, capable of carrying 2,780 tons cargo. The dimensions are:—Length, 246 ft.; breadth, 37 ft.; depth, 22 ft. As the vessel left the ways she was named *Glydesdale*. The owners are Messrs. J. & N. Roxburgh, Glasgow.

**Palawan.**—On September 4th Messrs. Caird & Co., Greenock, launched a screw steamer named *Palawan* for the Peninsular and Oriental Steam Navigation Co. Dimensions:—Length, 400 ft.; breadth, 46 ft. 6 in.; depth, 31 ft.; with a deadweight carrying capacity of 6,000 tons. The builders will supply triple-expansion engines of 3,000 H.P., and the steamer is to be capable of making 12 knots when fully laden. She has superior accommodation for 50 first-class and 25 second-class saloon passengers, and is fitted with all the most modern appliances for the rapid loading and discharging of cargo. The ceremony of naming the vessel was performed by Mrs. James Glen, wife of Mr. Glen, banker, and amongst the rest of the company present were Mr. Patrick Caird, Mr. and Mrs. Arthur Caird, Rev. Robert Barclay and Mrs. Barclay, Mrs. Kenay Peile (London), Mdlle. Pécontal, Mr. Lansdowne Beale (director of the Midland Railway), and Mrs. Beale, Mr. and Mrs. Robert Lyle, Miss Alice Briggs (London), Mr. and Mrs. H. J. Taylor and the Misses Taylor, Miss Turner, Mr. John Pettigrew, Captain Gadd (commander), &c. The *Palawan*, which is a sister ship to the *Sunda*, launched some months ago, is the fourth steamer built for the P. & O. Co. by Messrs. Caird & Co. this year, and they have now on the stocks the *India*, of about 8,000 tons.

**Tientsin.**—On September 5th Messrs. Scott & Co., Greenock, launched from their shipbuilding yard a fine steamer, *Tientsin*, for the China Steam Navigation Co., Limited. The dimensions are:—Length, 256 ft.; breadth, 38½ ft.; and depth, 21 ft.

Her gross tonnage is 2,080, and she will be supplied with triple-expansion engines of 1,500 H.P. by the builders.

**Thistle.**—On September 5th Messrs. W. B. Thompson & Co., Limited, Dundee, launched from Caledon Shipyard a hopper barge of about 100 tons, named the *Thistle*, which they have constructed for the Peterhead Harbour of Refuge Works. The barge will be principally used for the conveyance of stones to the breakwater at present in course of erection at Peterhead. She is propelled by steam, being fitted with twin screws, and carries several steam winches and a steam crane. Her length is 110 ft.; breadth, 24 ft.; and the depth of hold is 10 ft., moulded. The engines, built at Lilybank Works, are compound surface-condensing, having cylinders of 12 in. and 24 in. with 18 in. stroke. The hull and machinery have been constructed according to specifications drawn up by Messrs. Coode, Son & Matthews, and carried out under the superintendence of Mr. Wingate. The naming ceremony was performed by Miss Wingate.

**Pizarro.**—On September 5th Messrs. James & George Thomson, Limited, launched from their yard the gunboat *Pizarro*, the second vessel of the seven they are building for the Spanish Government, and which are to be employed in quelling the insurrection in Cuba. This vessel is of 300 tons measurement, and is similar to the *Hernan Cortes*, launched ten days ago. The *Hernan Cortes* went down the river on Wednesday, September 4th, for official trials, and these were passed through satisfactorily, a mean speed of 13½ knots being attained, which is considerably over the requirement of the contract. This vessel will now be fitted out complete with guns, ammunition, stores, &c., and is expected to leave early next week for Cuba.

**Teenkal.**—On September 5th Messrs. David & William Henderson & Co. launched from their yard at Partick a large steel screw steamer, which they have built to the order of Messrs. the China Mutual Steam Navigation Co., Limited, of London. The vessel is a duplicate of the *Moyune*, recently delivered by Messrs. Henderson to the same owners. The dimensions are:—Length, 410 ft.; breadth, 48 ft.; depth, moulded, 29 ft. 2 in., with a gross tonnage of about 4,650 tons. The vessel is classed in Lloyd's registry 100 A1 three deck, and is built to the requirements of the Board of Trade for a passenger certificate. The erections consist of poop, bridge, and fore-castle, with houses on the bridge for the accommodation of passengers, officers, and engineers. The saloon and state-rooms are handsomely finished and fitted. The crew are berthed forward under topgallant fore-castle. Awnings are fitted fore and aft. There are two complete steel decks, and the weather decks throughout are sheathed with teak. Water ballast will be carried in the double bottom, both peaks and a large hold tank providing a total quantity of about 1,550 tons. The cargo working arrangements are of the most complete description, there being 10 steam winches of large size. In addition to the derricks on the masts, side-derricks are also fitted, and a very large derrick is stepped on deck capable of lifting 30 tons. The vessel is lighted throughout with electric light, fitted by Messrs. W. C. Martin & Co., Glasgow; has steam steering gear, steam windlass, and a steam-warping capstan, and will be rigged as a two-masted schooner; the top-masts will be telescopic to suit the Manchester Ship Canal. The machinery has been constructed by the builders' firm, and consists of a set of triple-expansion engines, with cylinders 27 in., 46 in., and 76 in. diameter, with a stroke of 60 in. The working pressure will be 180 lbs., steam being supplied by three large single-ended boilers with Howden's forced draught. The propeller is of manganese bronze. On leaving the ways the vessel was named *Teenkal* by Mrs. Gulland, wife of the managing director of the company.

**Norman.**—On September 5th Messrs. J. & J. Hay launched from their yard in Kirkintilloch a screw steamer for the coasting trade. She was christened the *Norman* by Miss Lawson, Kirkintilloch, and will carry 110 tons. She measures 66 ft. by 18 ft. by 9 ft., moulded sizes, and is to be fitted up with a compound surface-condensing engine by Messrs. Ross & Duncan, Glasgow.

**Glengowan.**—On September 6th Messrs. A. Rodger & Co., Port-Glasgow, launched a full-rigged steel sailing ship for the Glen Shipping Co., Glasgow. Dimensions:—Length, 265 ft.; breadth, 40 ft.; depth, 23 ft. 6 in. The register tonnage is 1,820 tons, and the vessel will carry 8,300 tons deadweight.



The ceremony of naming the vessel *Glenogowan* was performed by Mrs. J. Franklin Adams, The Grange, Wimbledon. Construction was superintended by Captain Doughty, who will command her. The new vessel will fit out at Port-Glasgow, where she will take in ballast. She will afterwards be towed to Swansea to load for San Francisco.

**Diego Velasquez.**—On September 7th Messrs. James and George Thomson, Limited, launched from their yard at Clydebank the third of the gunboats ordered by the Spanish Government for the purpose of quelling the insurrection in Cuba. The vessel was named *Diego Velasquez*, and registers 200 tons. Lieut. Cervera, of the Spanish Navy, has superintended the construction, and the ship will have the highest class in the British Corporation Registry.

**Iron Barges.**—On September 7th there was launched from the shipbuilding yard of Messrs. Cumming & Ellis, Inverkeithing, two iron barges, 60 ft. by 12 ft. 6 in. by 5 ft. 6 in., built for trading on a canal in Ireland. These vessels are intended to carry from 70 to 80 tons, and will be fitted with engines by an English firm. These are the two first of five presently building by the same builders. During construction the vessels have been built under the superintendence of Mr. F. Dudley Fletcher, engineer, Dublin.

**Rio Xapury.**—On September 9th Messrs. Murdoch & Murray launched a steel twin-screw steamer for passenger and cargo service on the River Amazon, named *Rio Xapury*, and of the following dimensions:—Length, 180 ft.; breadth, 27 ft.; and depth, 15 ft. 3 in. to awning deck. This is the sixth vessel built by Messrs. Murdoch & Murray for the same owners. Compound surface-condensing engines will be supplied by Messrs. Lees, Anderson & Co., Glasgow.

**A Barge-loading Dredger.**—On Tuesday, September 10th, a new barge-loading dredger, one of the largest and most powerful vessels of its type afloat, was launched with its machinery on board at the works of Messrs. William Simons & Co., Limited, Renfrew. It is built to the order of the Mersey Docks and Harbour Board, and has all the latest improvements, and is specially adapted for rock dredging. It is fitted with two sets of triple cylinder engines for propelling and one independent set for dredging, three mild steel boilers, 160 lbs. working pressure, tested to 360 lbs. hydraulic test; three independent sets of engines for ladder hoist and mooring crabs at bow and stern, central bucket ladder and chain of steel buckets, adapted to dredge banks and shoals, and to 45 ft. depth of water. The buckets have strong steel mouth-plates and steel picks for dealing with rock and hard material. The total weight of the bucket chain is 100 tons exclusive of bucket ladder and mountings. The vessel is subdivided into 13 watertight compartments by bulkheads carried up to the upper deck. Electric light appliances, steam starting and steering gear, Weir's feed heater, evaporator, and Harris' water filter are provided, also a 5-ton derrick crane. The main steam pipes are armoured with galvanised steel wire wound round them for safety. Three independent surface condensers with independent air and circulating pumping engines, centrifugal pumps for supplying water to the shoots are also fitted. The dredger has been constructed under the direction of the Mersey Docks Board Engineer, Mr. A. G. Lyster, C.E., Mr. Morgan superintending engineer, Mr. R. Anderson, resident inspector. This is the ninth vessel constructed by William Simons & Co. for the Mersey Dock and Harbour Board.

**Ponce de Leon.**—On September 12th another of the gunboats being built at Clydebank by Messrs. James & George Thomson, Limited, was successfully launched. This vessel, which was named *Ponce de Leon*, is the fifth of the order placed with Messrs. Thomson in July by the Spanish Government. All these vessels are intended for service in Cuba, and they are being constructed to the highest class under British Corporation.

**Vasco Nunez de Balboa.**—On September 12th Messrs. James and George Thomson, Limited, launched from their yard at Clydebank, a Spanish gunboat named *Vasco Nunez de Balboa*. The vessel is 300 tons displacement, and is the fourth of seven vessels recently ordered of Messrs. Thomson by the Spanish Government for service in Cuba. She has been constructed to the highest class under British Corporation rules. The first vessel under the above order, the *Hernan Cortes*, has left the Clydebank yard, and after taking ammunition on board at Bowling, will proceed to Cuba.

**Cambols.**—On September 17th Messrs. Fleming & Ferguson, Limited, shipbuilders and engineers, Paisley, launched the powerful steel twin-screw hopper dredger *Cambols*, built to the order of Messrs. The Blyth Harbour Commissioners, Blyth. The dimensions of the vessel are 180 ft. by 35 ft. by 14 ft. She will be capable of raising about 600 tons per hour from a depth of 40 ft., and has a hopper capacity of 600 tons. The *Cambols* is fitted with the builders' patent independent power-driven traversing gear for travelling the bucket ladder in advance of hull, and so enabling the vessel to cut her own flotation. The bucket ladder is suspended by steel wire ropes working in a grooved barrel, and is raised and lowered by an independent auxiliary engine. Main engines are compound surface-condensing of 800 H.P., steam being supplied by two horizontal multitubular boilers. The machinery throughout is of the most modern and improved description, and the gearing is entirely of steel. Powerful triple-gear mooring winches are fitted fore and aft of the vessel. Steam-driven winches are also fitted at ends of hoppers for raising the doors, which are of special construction. The *Cambols* has been constructed to the design and specification of Messrs. J. Watt, Sandeman & Moncrieff, C.E., Newcastle-on-Tyne, engineers for the Blyth Harbour Commissioners, and the vessel during construction has been under the inspection of Mr. John Duff, resident engineer. As the dredger left the ways she was named the *Cambols* by Mrs. Naismith, of Lennoxton.

**Oratic Couppas.**—On September 18th Messrs. Gourlay launched at Dundee a two-masted partial awning-decked steel screw steamer named *Oratic Couppas*, for Mr. Nicholas Couppas Marseilles. Her principal dimensions are:—Length, 309 ft.; breadth, 39 ft. 9 in.; and depth, 21 ft. 2 in., moulded to main deck. The gross tonnage is about 2,700, and she is built of steel throughout.

**Kut Wo.**—On September 18th the London and Glasgow Engineering and Shipbuilding Co., Limited, launched from their yard at Govan, the s.s. *Kut Wo*, built for the Indo-China Steam Navigation Co., Limited, London. The vessel, which is of a very unusual form, is intended for the Yangtze river in China. The principal dimensions are:—Length, overall, 301 ft.; breadth, overall, 54 ft. 6 in.; depth from top deck, 29 ft. 3 in.; gross tonnage, about 2,800. The hull is of steel, and is very much heavier than those of the ordinary river steamers of this country. The main deck is steel throughout, and the upper and awning decks, which extend all fore and aft, are of pine, covered with canvas. The whole of the space up to the upper deck is utilised for cargo, most of the tea from the inland towns being carried by these steamers to the coast, where it is transhipped into large cargo carriers like those of the Glen Line. On the upper deck there is sleeping and saloon accommodation for 220 third-class and 180 first-class Chinese passengers in a large deck-house extending nearly all fore and aft. These spaces are thoroughly well lighted and ventilated to suit the hot season, and are also heated with steam for the cold season. The European accommodation is on the top deck, and consists of a large central deck-house, with saloon, passengers' cabins, captain's room, and wheel-house. Side-houses are provided for the engineers, officers, pilots, &c., and all are fitted up in a first-class style. There is a guard all round the ship at the main-deck, and the fore part of the vessel is built out to meet it. Gangway doors are fitted at each of the four cargo hatches, and as the cargo is loaded and discharged by porters, there are no winches to disturb the passengers. The hatches and gangways are all on the main deck. Cargo stages are fitted in all the hatches from the hold to the main deck, as all the cargo is handed from stage to stage until it reaches the top. The vessel has Napier Bros.' steam windlass in the fore-castle, with capstan above, also Napier Bros.' steam warping capstan aft. Caldwell & Co.'s steam steering gear is fitted in the engine-room, and the vessel is lighted throughout by electricity, this work being done by Messrs. J. H. Holmes & Co., Newcastle. The machinery consists of two sets of triple-expansion engines capable of developing 1,600 I.H.P. The cylinders are 14 in., 25 in., and 37 in. diameter, and the stroke 50 in. There are two boilers, 18 ft. 3 in. in diameter by 10 ft. 6 in. long, working at a pressure of 160 lbs. They are fitted with Howden's system of forced draught. A horizontal tubular boiler is also provided for working the auxiliary engines. As the vessel left the ways she was gracefully named the *Kut Wo* (which in English is "Fortune and Harmony") by Miss M'Adam, Craigadam, Pollokshields. The

vessel was afterwards towed to Finnieston crane to receive her machinery, which the builders supply.

**Daisy.**—On September 19th Messrs. Blackwood & Gordon, Port-Glasgow, launched a steel screw steamer, built to the order of the Glasgow, Dublin and Londonderry Steam Packet Co. Dimensions:—Length, 190 ft.; breadth, 29 ft.; depth, moulded to quarterdeck, 15 ft.; gross tonnage, 560 tons. The new vessel, which is built to Lloyd's highest class, has been fitted up for the carrying of passengers, cattle, and cargo between this country and various Irish ports, and on leaving the ways she was gracefully named *Daisy* by Miss Turnbull, daughter of one of the directors. Triple-expansion engines will be supplied by the builders, with cylinders, 15 in., 24 in., and 40 in. diameter by 30 in. stroke.

**Donal.**—On September 19th Messrs. R. Napier & Sons, Limited, launched from their shipyard, at Govan, a steel screw steamer of about 800 tons, for the Compagnie Messageries Fluviales de Cochinchine. This is the fourth steamer of the type which Messrs. Napier have recently constructed for the company, and, like the others, she has been built under special survey to the highest class at Bureau Veritas. The decks and wood fittings are of teak, and the latest improvements for efficiency and economy have been introduced. The principal dimensions are:—Length, extreme, 220 ft.; breadth, extreme, 27 ft. 10 in.; depth, moulded, 14 ft. 9 in.; with a topgallant forecastle, long bridge, and full poop. As the vessel is intended for service in a hot climate, the passenger accommodation has been placed on the upper deck, to admit of good ventilation, and includes very superior quarters amidships for the first class, with a handsome dining saloon in selected bird's-eye maple and mahogany. The state-rooms adjoining are extra large, and are fitted with the most modern appliances. A comfortable saloon and state-rooms for the second-class passengers have been provided in the poop; the captain's and officers' cabins are in a teak house on the bridge deck, and the crew and firemen are berthed in the forecastle. The machinery consists of a set of triple-expansion engines, capable of indicating 600 H.P., with two single-ended boilers for a working pressure of 144 lbs. The vessel was named the *Donal* by Miss Seligmann.

**Den of Airlie.**—On September 19th Messrs. Charles Connell & Co., Whiteinch, launched from their Sootstoun shipbuilding yard a large steel screw steamer, built to the order of Mr. Charles Barrie, shipowner, Dundee. Her dimensions are:—Length, 344 ft.; breadth, 44 ft. 6 in.; depth, moulded, 28 ft. 6 in., with a deadweight capacity of 5,600 tons. She has been built to Lloyd's highest class as a three-deck steamer, with a full poop, bridge and topgallant forecastle, also cellular double bottom right fore and aft for water ballast. Each hatch is equipped with winches and derricks, completely arranged for speedy loading and discharging, while she is fitted with a powerful steam windlass, Caldwell's steam steering gear, and all the most recent appliances for the safety and efficient working of the vessel. She will be rigged as a two-masted fore-and-aft schooner, with telescopic topmasts to suit Manchester Canal. Accommodation is provided in forward house on bridge deck for saloon, captain's room, and spare rooms, while the officers and engineers are located in house at after end of bridge deck, the whole being fitted up in a substantial and comfortable manner, the crew, as usual, being berthed in topgallant forecastle. The vessel has a complete installation of electric light, including searchlight for use in Suez Canal, by Messrs. W. C. Martin & Co., Glasgow. The engines, which are of the most approved triple-expansion type, having cylinders 25 in., 41 in., and 67 in. diameter by 45 in. stroke, worked by two single-ended boilers, 14 ft. 10 in. by 11 ft. 6 in. fitted with Howden's forced draught, and capable of driving the vessel 10½ knots loaded at sea. As the vessel left the ways she was named *Den of Airlie* by Miss Peters, Springfield, Dundee.

**Draco and Dorando.**—Two trawlers have lately been launched for the Grimby and North Sea Steam Trawling Co., by Messrs. Mackie & Thompson, Govan. Dimensions:—95 ft. by 20 ft. by 11 ft. 6 in.; moulded about 140 tons gross. They are to be fitted with triple-expansion engines by Messrs. Muir & Houston, Kinning Park. The cylinders are 10 in., 16 in. and 26 in. by 21 in. stroke, with boiler 8 ft. by 9 ft. 6 in., 175 lbs. working pressure, and the vessels are fitted with powerful steam winches and the latest approved appliances for the important trade in which they are to be engaged. The vessels as they left the ways were named the *Draco* and *Dorando*. The

*Draco* and *Dorando* are the 12th and 18th vessels which the builders have built for this company.

**Galeb.**—The Campbelltown Shipbuilding Co. launched from their yard at Campbelltown, Clyde, on September 21st, a handsomely modelled steel screw steamer, of the part awning deck type. The vessel registered about 1,800 tons gross, and has been specially built to carry a large deadweight on a small draught. All the most improved appliances for navigating the ship and for the speedy loading and discharging of cargo are to be supplied, including steam windlass, steam steering gear, patent stockless anchors, and Clarke, Chapman & Co.'s steam winches. The vessel is fitted with cellular double bottom for water ballast, and has a raised quarter-deck extending to the engine-room, the 'tween deck space in forehold being utilised for cargo. The accommodation for captain, officers and engineers is situated under awning deck before engine-room, and is surmounted by a deck-house, containing cabin entrance, wheel-house, and a spacious chart-room. Awnings are being supplied throughout the ship. The whole arrangements are of the most complete description, special attention having been paid to lighting and ventilation. The crew and firemen are as usual to be berthed forward under the awning deck. The engines, which are being supplied by Messrs. John G. Kincaid & Co., Clyde Foundry, Greenock, are of the triple-expansion type, and have 20 in. H.P. cylinder by 36 in. stroke, steam being supplied at a working pressure of 165 lbs. There is also a large donkey boiler, capable of supplying ample steam to the steam winches. The average speed loaded at sea is to be 9½ knots on a small consumption of fuel. The vessel, which has been built for Austrian owners, and is intended for general trade, is to be classed 100 A1 at Lloyd's, and has also been accepted by the Austrian Veritas for classification to their highest class. As the vessel left the ways she was gracefully named *Galeb* by Mrs. Tom Reid, Pollokshields, Glasgow.

#### LAUNCHES.—IRISH.

**Historian.**—Messrs. Harland & Wolff, Belfast, have lately launched the large steel screw steamer *Historian*, built to the order of T. and J. Harrison, of Liverpool. The vessel, which is intended to run in the Harrison Line between Liverpool and Calcutta, is 460 ft. in length. Her tonnage is about 6,900 tons. She will have four pole masts, schooner-rigged, and be fitted with all the most improved appliances for working of ship and cargo, as well as with electric light. Her machinery consists of a set of triple-expansion engines, constructed by the builders in their engineering works at Belfast.

**Kintuck.**—On September 3rd Messrs. Workman, Clark & Co., Limited, launched the fourth vessel constructed by them for the China Mutual Steam Navigation Co., Limited, of London. As she left the ways the ceremony of naming her *Kintuck* was performed by Miss Reid, daughter of the chairman of the China Mutual Steam Navigation Co. This vessel is a sister ship to the *Peking*, recently launched for the same firm, and is specially adapted to the company's trade between Great Britain, China and Japan. She has been built to Lloyd's highest class and with Board of Trade passenger certificate. The upper and main decks are of steel with the upper in addition sheathed with teak. On the upper deck the erections consist of a long poop, bridge and topgallant forecastle, decks of teak. The accommodation for the captain and passengers is placed in a deckhouse on the bridge and extending across the front of it. The hatches have been fully provided with powerful steam winches and derricks, capable of giving a rapid loading or discharging of cargo. The *Kintuck* is fully equipped with the most recent types of deck machinery and plant, and with a full installation of electric lighting. After the launch the vessel was towed to the crane to have the machinery put on board, and it is expected in the course of a few weeks that she will be ready for sea.

**Glengowan.**—On September 4th Messrs. A. Rodger & Co., launched a finely-modelled sailing ship, of 1,820 tons register, and of 3,300 tons deadweight, her dimensions being:—Length, 265 ft.; breadth, 40 ft.; and depth, 23 ft. 6 in. The new vessel, which will be full rigged, was built under the superintendence of Captain John Erskine for the Glen Shipping Co., Glasgow, and on leaving the ways was named *Glengowan* by Mrs. J. Franklin Adams, of Wimbeldon. After fitting out the *Glengowan* will take in ballast and be towed to Swansea, where she will load a cargo

of coal for San Francisco. She will be commanded by Captain Doughty.

**Mourne.**—On September 19th Messrs. Workman, Clark & Co., Limited, launched at Belfast a steel screw steamer named the *Mourne*, of about 3,300 tons gross register.

**Centaur.**—On September 19th Messrs. Workman, Clark & Co., Limited, launched at Belfast a steel screw steamer named the *Centaur*, built to the order of Mr. Alfred Holt, of Liverpool, and intended for their trade on the Chinese coast. The dimensions of the vessel are:—Length, 275 ft.; breadth, 41 ft.; and moulded depth, 21 ft. 9 in. She will be supplied with machinery at the builders' engine works.

#### LAUNCH—AMERICAN.

**Aurania.**—On September 2nd there was launched by the Chicago Shipbuilding Co., the *Aurania*. Her dimensions are:—352 ft. keel; 365 ft. over all; 44 ft. beam; 26 ft. deep, with 4½ ft. tank. She is a tow barge without power of any kind, save a small engine for working the deck hoist, windlass, towing machine and steering. She is built on the channel system of connection, and will carry 4,000 tons net, through the Soo river, her draught being 16 ft. She is the largest vessel of the kind on the lakes. Owner, John Corrigan, of Cleveland, Ohio.

#### LAUNCH—NORWAY.

**Genova.**—On August 24th there was launched from the yard of the Bergens Mekaniske Værksted, of Bergen, a steel screw steamer of the following dimensions:—Length, over all, 226 ft.; breadth, moulded, 31 ft. 6 in.; depth, 15 ft. 3 in. The ship is built to the highest class in the Norwegian Veritas, and has raised quarterdeck, bridge and topgallant forecastle. Double bottom for water ballast in main and after holds, and peak tank aft, steam steering gear, steam windlass, three steam winches, donkey boiler, &c. Every modern improvement has been embodied in her construction and outfit. She is built especially for the Baltic wood trade. The engines are triple compound, with cylinders 15½ in., 25 in., and 42 in. diameter, by 30 in. stroke. One steel boiler, constructed for a pressure of 160 lbs. per square inch; speed about 9 knots. The ship was named *Genova*, and is built to the order of P. Hamre, Esq., of Bergen.

#### TRIAL TRIPS.

**Feveril.**—On August 27th the s.s. *Feveril*, which has been built by Messrs. Scott & Sons, Bowling, for Messrs. William M'Lachlan & Co., fish salesmen, Bridgegate, Glasgow, went down the Firth on her trial trip. The vessel, the dimensions of which are 135 ft. by 28 ft. by 11 ft., will be engaged in the fish trade, and is intended to run between Loch Fyne, Islay, the Western lochs, and the North of Scotland, attending fleet trawlers and drift-net boats. Keeping near the banks in the different districts all night, she will take the catches from the fishermen as they are offered, and as soon as a good cargo is obtained she will proceed at once to Glasgow. The engines, which are the work of Messrs. Muir & Houston, are of the compound surface-condensing type, with cylinders having a diameter of 17½ in. by 40 in. and a stroke of 27 in. The boiler is worked at a pressure of 150 lbs. to the square inch, and the advance shown represents greater economy and increased pressure for such a small engine.

**Olaf Kyrre.**—On August 27th the screw steamer *Olaf Kyrre*, built by Messrs. J. Readhead & Sons, of South Shields, had a most successful trial trip off the Tyne. The vessel, which is 321 ft. long, 41½ ft. broad, and 24 ft. 4 in. deep, moulded, is of the partial awning deck type, has cellular bottom fore and aft, and is fitted with the latest appliances for the rapid discharging of cargo. Her engines, which have also been built by Messrs. Readhead & Sons, are on the triple-expansion principle, having cylinders of 24 in., 40 in., and 64 in., with 42 in. stroke. Steam is supplied by two large steel boilers working at a pressure of 160 lbs. The *Olaf Kyrre* is classed 100 A1 at Lloyd's, and also takes the highest class in the Norwegian Veritas. She was built under the superintendence of Mr. Bodin and Captain Falsen. After her compasses had been adjusted she was run seven times over the measured mile,

and attained a mean speed of 11½ knots. The machinery worked smoothly, and the trial altogether gave the fullest satisfaction to the owners, Messrs. Bergh & Helland, of Bergen.

**Aureole.**—On Tuesday, August 27th, the Tyne Iron Shipbuilding Co., Limited, of Willington Quay-on-Tyne, had a most successful trial trip of their new tank oil steamer *Aureole*. This vessel, which ranks amongst the largest of this type of steamer yet built on the Tyne, is 357 ft. by 47 ft. by 30 ft. 3 in., and is fitted with topgallant forecastle, bridge house, and long, full poop. She is subdivided into sixteen compartments for carrying oil in bulk, in addition to two coffer dams placed at the fore and after ends of the oil-carrying compartments. She has also a large fore hold for carrying general cargo, and the pumps are arranged at the fore end of the oil-carrying spaces. She has a large and complete installation of electric light, and her pumping arrangements for dealing with her oil cargo are of the best and most modern description. Her machinery, which has been supplied by the Wallsend Slipway and Engineering Co., Limited, of Wallsend-on-Tyne, consists of triple-expansion engines having cylinders 27 in., 44 in., and 71 in., by 48 in. stroke, with three large single-ended boilers, and worked splendidly, giving unqualified satisfaction. A series of progressive trials were made, the last of which gave a result of nearly 12 knots in loaded condition. The vessel has been built to the order of Messrs. Hunting & Son, of Newcastle-on-Tyne, under the superintendence of Captain Brunton and Mr. Taylor, and is a notable addition to the fleet of tank oil steamers.

**Dorothea Rickmers.**—On August 27th the steel screw steamer *Dorothea Rickmers*, built at the Walker Shipyard of Sir W. G. Armstrong, Mitchell & Co., was taken to sea for her trial trip. *Dorothea Rickmers* is the latest addition to the fleet owned by Rickmers Reismuhlen Rhederei Actien Gesellschaft, of Bremen. The principal dimensions of the vessel are:—Length, 340 ft.; breadth, 44 ft.; depth in hold, 25 ft. 8 in. She has been constructed to the highest classification in Lloyd's registry. The vessel has been fitted with triple-expansion screw engines, manufactured by the Wallsend Slipway and Engineering Co. The trial lasted for several hours, during which the vessel made a series of runs on the measured mile off Whitley, when a mean speed of 12 knots was attained, the machinery working with smoothness and regularity, and giving every satisfaction. After the trial the *Dorothea Rickmers* proceeded to Cardiff.

**Konningen Wilhelmina.**—On August 27th the *Konningen Wilhelmina*, the first launched of the three paddle steamers which the Fairfield Co. are building for the Zealand Steamship Co., Flushing, concluded her trials on the Clyde. In the tests which were made on Saturday, the guaranteed speed had been exceeded by about a knot and a quarter, and the object of Tuesday's run was chiefly to try the machinery under varying conditions. For the greater part of the day the vessel steamed between the Cloch and the south end of Arran, and in the evening returned to the Tail of the Bank. She will shortly leave for Flushing, and on October 1st the accelerated service, which the *Konningen Wilhelmina* and her sister ships are to maintain, will be commenced. The *Konningen Wilhelmina* is in every way a typical Fairfield boat. In the important matter of accommodation the arrangements are as nearly perfect as is possible in shipbuilding. The company's adherence to the paddle steamer in a day of twin-screws may be difficult to understand, but, as a matter of fact, the directors believe the older style is safer. An accident like the sinking of the *Seaford* would, they claim, have been impossible in the case of a boat like the *Konningen Wilhelmina*, because, in addition to the protection afforded by subdivision of the hull, the vital parts of the ship are protected by the paddle-boxes. Where the development of the Fairfield type, however, is most pronounced is in the engine-room. The machinery, which is three-cylinder triple-expansion, is rather an unusual type in paddle boats. The engines, which are the most powerful of the type ever made for a paddle-box, are of about 9,000 H.P., and the cylinders are 51 in., 75 in., and 112 in. in diameter.

**Corsica.**—The steel screw steamer *Corsica*, 1,103 tons gross register, recently launched by Messrs. Ramage & Ferguson, Limited, Leith, for Messrs. James Currie & Co., of the same port, having completed a series of exhaustive trials in both a light and loaded condition, sailed on August 27th on her maiden voyage to Hamburg from Leith. This steamer is the first of a new type which Messrs. James Currie & Co. are having built for general cargo purposes, but which have been constructed to

the Board of Trade requirements, so that at any time they may be converted into passenger steamers. On the measured mile at Gullane, with tanks full, but no cargo on board, the speed was 12.5 knots, and on a four hours' run at sea, with a full cargo of 1,200 tons on board, 11.67 knots were attained. This result is all the more satisfactory in view of the fact that there was a stiff westerly gale blowing while the trials were being made, during which the behaviour of the new vessel was everything that could be desired.

**Le Coq.**—On August 28th this vessel was taken on her trial trip. She was built by Messrs. Armstrong, Mitchell & Co. at the Walker Yard on the Tyne, and is of the following dimensions:—330 ft. by 42 ft. 8 in. beam, and 29 ft. 6 in. depth. The vessel is fitted with engines having cylinders 24 in., 40 in., and 64 in., by 48 in. stroke, supplied with steam from two large single boilers. The vessel was taken on a ballast trial with bunkers full, and three oil tanks filled with water, drawing a mean draught of 19 ft. 1 in., when she made a mean speed of 11½ knots on the measured mile; steam pressure, 160; revolutions, 66 mean. The managing owner (Mr. MacAndrew, of Messrs. Lane & MacAndrew, London), attended the trial trip, which proved most satisfactory. There were also present on behalf of the management, Messrs. Flannery, Baggallay, & Johnson, of London and Liverpool, consulting engineers, under whose supervision the vessel will run. The *Le Coq* proceeded direct to sea to take up her service, which will be between the United States and the Continent.

**Cavour.**—On Wednesday, August 28th, the trial trip of the large steel screw steamer *Cavour* took place in Tees Bay. This vessel has been built by Sir Raylton Dixon & Co., Cleveland Dockyard, Middlesbrough, for Messrs. Lamport & Holt, Liverpool, and intended to trade between Liverpool and the West Coast of South America. She is the largest steamer yet built in the Tees district, her dimensions being:—Length, 425 ft.; breadth, 51½ ft.; depth, 30½ ft. She is built to Lloyd's three-deck rule, and has a displacement of 11,000 tons with a deadweight capacity of about 7,500 tons. Special arrangements have been made for the rapid discharge of cargo, and she is fitted with 9 steam winches working not only from the masts, but from standard derrick posts erected on deck, with hatches at sides of ship as well as those in the centre. Her machinery has been constructed by the North Eastern Marine Engineering Co., Limited, of Wallsend, and consists of a set of triple-expansion engines, having cylinders 31 in., 49 in., and 82 in. by 54 in. stroke, with three large double-ended boilers working at 180 lbs. pressure. Mr. Melly, one of the firm of Lamport & Holt, was present at the trial trip, which was very successful. The vessel is designed to maintain a loaded speed at sea of over 12 knots. The hull and machinery have been constructed under the supervision of Mr. Russell, naval architect to the owners, and Mr. Morrin, their superintendent engineer, respectively. On the conclusion of the trial trip the vessel proceeded to the Tyne, under the command of Captain Askew, to take in bunkers.

**Argo.**—We were able to announce a few months ago that the enterprising local firm, Messrs. Rickinson, Son & Co., of West Hartlepool, had ordered two large steamers to be built by Messrs. William Gray & Co., Limited. The first of these—the s.s. *Argo*—has been loaded at Middlesbrough with a cargo of railway iron and other material for Bombay, and went on her loaded trial trip on August 29th from that port. The second—the s.s. *Aries*—is now under the sheerlegs receiving her machinery. These steamers are remarkable inasmuch as they belong to a somewhat new class of steamer, the design of which has been carefully developed at the shipyard of Messrs. William Gray & Co., Limited, and from which design some eight or ten steamers have already been built; but with the exception of the s.s. *Mailing*, owned by the West Hartlepool Steam Navigation Co., the *Argo* and the *Aries* are the first of this type to be owned and registered at the port of West Hartlepool. The design is principally remarkable on account of the great deadweight that can be carried on a shallow draught of water, thus enabling the steamers to save much time and expense by dispensing with lighterage when trading in such waters as the river Plate and Danube ports. The design also offers advantages to the shipowner, inasmuch as the registered tonnage shows an exceedingly favourable figure compared with the deadweight carried. The s.s. *Argo* left Middlesbrough with a deadweight on board of close on 5,000 tons, whilst drawing only 20 ft. 2 in. mean draught. She responded to the rudder exceedingly well,

her handiness being specially remarked upon by the experts on board. Her machinery consists of a set of triple-expansion engines built at the Central Engine Works, and having cylinders 24 in., 38 in., 64 in. in diameter, with a piston stroke of 42 in. The boilers are of large size and work at a pressure of 160 lbs. per square inch. There was an ample supply of steam throughout the trial and the engines ran in the most perfect manner during the whole trial without the slightest trouble of any kind and without any water being applied to any of the bearings. After the completion of the compass adjusting the vessel was run at full speed out and home again for nearly two hours, the log showing that her mean speed over the whole run was at the rate of almost exactly 10 knots per hour. The general finish of the machinery and accessories, the handiness of ladders and gratings, and the cheerful and light appearance of the whole engine-room were much remarked and favourably commented upon. A number of specialities have been supplied, conducing to the economy, good working and long life of the machinery, including Kitching's patent lubricator, Mudd's evaporator, Kitching & Smith's improved stern tube arrangements, and an important and valuable improvement in engine-room telegraphs known as the "triple automatic telegraph," which, when combined with the very handy steam starting and reversing gear always supplied with Central engines, enables the engineer both to give the telegraphic reply to the bridge, and alter the direction of his engines in an almost incredibly short space of time, reversal from full speed ahead to astern being accomplished in four or five seconds. The advances in design of modern cargo steamers and the economy of modern marine machinery receive a notable illustration in the s.s. *Argo*, which vessel will carry almost 5,000 tons deadweight on a little over 20 ft. draught at a speed of nine knots per hour on less than 15 tons of coal per day for propulsive purposes. Immediately after the trial, which took place on August 29th, the vessel proceeded on her voyage to Bombay.

**Tyr.**—On August 31st the *Tyr* steamship, recently launched from the yard of Messrs. John Blumer & Co., Sunderland, proceeded to sea to run her trial trip. The vessel has been built to the order of Mr. Wilhelm Wilhelmsen, of Tonsberg, and is of the following dimensions and particulars:—Length between perpendiculars, 285 ft.; beam, 40 ft.; depth, moulded, 20 ft. Classed 1, A1, Norwegian Veritas, under special survey. The vessel is a fine specimen of the modern cargo boat, having deck machinery of the latest and most improved type, her general appearance and workmanship being favourably commented upon. The engines have been constructed by Messrs. George Clark, of Southwick, and throughout the trial worked smoothly and without the slightest hitch. The vessel attained the mean speed of 11 knots per hour over the measured mile. After the trial she proceeded to Blyth to load for Genoa.

**Victorian.**—On August 31st this steamer, which has been built by Messrs. Harland & Wolff, Belfast, to the order of Messrs. Frederick Leyland & Co., of Liverpool, for their service from Liverpool to Boston, proceeded from her berth in the Abercorn Basin, Belfast, for trial in Belfast Lough in charge of Captain Trant. The *Victorian* is of the following dimensions:—512 ft. long, 59 ft. broad, and 39 ft. deep, and is of 8,766 tons register. She is propelled by single-screw engines, with cylinders 31 in., 52 in., and 86 in. diameter and 66 in. stroke, four boilers, all fitted complete with Henderson's patent automatic self-cleaning furnaces, and has been built to meet the requirements of Lloyd's 100 A1 class, and furnished with Board of Trade passenger certificate. The ship has been arranged for carrying a large number of cattle, accommodation being provided for over 900 on the upper and shelter decks, and the ventilation being on the most approved plan. The officers, engineers, passengers, and firemen will be located below the upper bridge deck, and the seamen and cattle men in the fore-castle. A neatly furnished and upholstered saloon and a room for cattle foremen are also situated below the upper bridge deck. The ship has been provided with powerful winches and every facility for the rapid loading and discharging of cargo, and is of large cargo-carrying capacity. Electric light has been fitted throughout, and refrigerating apparatus by the Kilbourn Refrigeration Co. has also been provided. The vessel while under construction has been under the supervision of Mr. Neville Evans, the company's superintendent engineer, and of Captain Fry, the marine superintendent. After a very satisfactory trial and adjustment of compasses, the *Victorian* proceeded to Liverpool to receive her cargo.

**Yimeria.**—On September 4th the trial trip of the s.s. *Yimeria*, built by the London and Glasgow Engineering and Shipbuilding Co., Limited, took place on the Firth of Clyde, when the vessel quite fulfilled the expectations of both owners and builders, the speed on the measured mile being 11 knots. The machinery worked most satisfactorily throughout. Amongst those on board were Mr. Menzies Mackean and Mr. Love, representing the owners, Messrs. A. C. Gow & Co., also Mr. George Macfarlane, Mr. Stromyaer, Lloyd's surveyor; while the builders were represented by Mr. Morison and Mr. Boyd.

**Pakling.**—On September 4th the new steel screw steamer launched some weeks ago from the shipbuilding yard of Messrs. Workman, Clark & Co., Limited, proceeded down Belfast Lough on her trial trip. The *Pakling* is the third steamer built by this firm for the China Mutual Steam Navigation Co., London, and two others are also far advanced in course of construction. The company on board included, among others, Messrs. David Reid, chairman of the China Mutual Co.; W. Galland, managing director; Captain Hogg, Fred Houlder Chase, Allan Frank Workman, George S. Clark, James Turpin, and John Mackellar. After cruising about the Lough for some time the vessel was tried on the measured mile with the most satisfactory results, the average speed attained being  $14\frac{1}{2}$  knots. The steamer afterwards returned to Belfast.

**Newfoundland.**—On September 4th the *Newfoundland*, a new steam steamer, went for her official trial trip. She is owned by the Hull Steam Fishing and Ice Co., Limited. The hull has been built by Messrs. Cochrane & Cooper, of Grovehill Shipyard, Beverley, and is of the following dimensions:—Length, 98 ft. by 20 ft. 6 in. in breadth, by 11 ft. depth of hold. The machinery comprises the latest type of triple-expansion engines, with cylinders 10 in., 16 in. and  $25\frac{1}{2}$  in. diameter, by 20 in. stroke, and steam is provided by a large steel boiler of the cylindrical multitubular type, tested to 340 lbs. per square inch, and working at a pressure of 170 lbs. per square inch. Both ship and machinery have been built to Lloyd's survey, and under the personal supervision of Mr. Beath, the owners' superintendent. During a run lasting several hours the machinery worked with unworked smoothness, and gave no trouble whatever. The sailing and steering qualities of the ship were also fully tested, and the owners may be congratulated on having added yet another to their already long list of successful steam trawlers. The company on board included Messrs. Maddick and Beath, representing the owners; Mr. Cochrane, the builders; and Messrs. Brackenbury and Wagg, the engineers.

**Rio Pauhin.**—On September 5th the steel twin-screw steamer *Rio Pauhin*, built by Messrs. Murdock & Murray, Port-Glasgow, and engined by Messrs. David Rowan & Son, Glasgow, went down the Firth on her trial trip. The vessel proceeded to the measured mile at Skelmorlie, and ran progressive trials, and a mean speed of  $11\frac{1}{2}$  knots was obtained, the machinery working satisfactorily throughout. After the speed trials were completed the steamer returned to Port-Glasgow, where she will complete fitting out and be prepared for her voyage to the Brazils. Messrs. H. Alexander & Sons, Glasgow, will supply the crew to deliver the vessel abroad.

**Urd.**—On September 7th this steamer, which has just been completed by Messrs. Ropner & Son, Stockton-on-Tees, for Norway, was taken to sea for her trial trip. She is a fine type of cargo steamer, will carry 4,700 tons dead weight, and has very large cubical capacity, having a part awning-deck extending over half the length amidships. Her engines are by Messrs. Blair & Co., Limited, and they worked smoothly from first to last while giving a speed of over 11 knots. The owner and Mr. R. Ropner, junr., were present, together with Mr. E. F. Wailes, of Newcastle-on-Tyne, under whose superintendence the steamer has been built. Everything being satisfactory, she steamed away to Blyth, to load a cargo for Messina. This is the third steamer built by Messrs. Ropner for the same owner.

**Rauma.**—On Saturday, September 7th, the steel screw steamer *Rauma*, built by Sir Raylton Dixon & Co., Cleveland Dockyard, Middlesbrough, for Captain Andreas Olsen, of Bergen, was taken out to sea for her official trial trip under the command of Captain Leading. She is a fine spar-deck vessel built to Lloyd's and Norske Veritas highest class, her principal dimensions being:—Length, 331 ft.; breadth, 42 ft. 6 in.; depth, 128 ft. 3 in., with a deadweight capacity of over 5,000 tons. The spar deck is of iron, main deck steel, and the poop,

bridge, and fore-castle decks of wood. The accommodation for the captain, officers, and engineers is amidships, and very handsomely fitted. Powerful triple-expansion engines have been fitted by Messrs. Thomas Richardson & Sons, Limited, of Hartlepool, having cylinders 24 in., 38 in. and 64 in. by 42 in. stroke, and supplied with steam by two extra large single-ended boilers working at 160 lbs. pressure. The engines worked very smoothly during the trial trip which was highly successful and satisfactory to all concerned.

**Westmeath.**—On Saturday, September 7th, the steamer *Westmeath*, the largest cargo vessel yet built on the East Coast, or indeed, in England or Scotland; and belonging to the well-known shipowner, Mr. R. M. Hudson, of Sunderland, was taken by the builders, Messrs. C. S. Swan & Hunter, of Wallsend, to sea for her trial trip. The vessel on Monday, September 9th, steamed from the builders' yard to Sunderland, where she was safely berthed in the Hudson Dock North for the purpose of receiving her bunker coals of which about 4,000 tons were placed on board. Considerable excitement was created by the entrance of this enormous vessel into the Sunderland Docks, her width being so great that it was a tight fit for the steamer to pass through the dock gates. The new steamer measures 465 ft. in length over all; 56 ft. in breadth; with a moulded depth of 34 ft. 6 in. She is built on the spar deck rule, with exceptionally long deck erections, her bridge being 250 ft. in length, on the top of which are spacious deck houses of steel for the accommodation of the captain, officers, engineers, and crew. The *Westmeath* will carry a general cargo of 10,250 tons deadweight, or 14,500 tons measurement cargo in addition to a very large bunker capacity. With a view of having to steam in ballast, the vessel has been built with a cellular double bottom extending over her entire length, in addition to which deep tanks are fitted aft, for the purpose of immersing the propeller. All the latest improvements in marine machinery have been introduced in the deck fittings, with a view of dealing promptly with the large cargoes which the vessel is intended to carry, nine of the most powerful steam winches yet made being fitted by Messrs. Welford Bros., in addition to which there is a complete outfit of improved derricks and gear placed at quarter distance along the various hatches. The machinery for propelling the vessel has been supplied by the Wallsend Slipway and Engineering Co., Limited, the engines being of the triple-expansion type, with cylinders 28 in., 46 in., and 75 in. respectively, having a 54 in. stroke. Steam will be supplied at 180 lbs. working pressure by three boilers 14 ft. 3 in. diameter, by 11 ft. 9 in. long, all fitted with Howden's latest system of forced draught, serve tubes and patent furnaces. The propeller blades are of Messrs. Hy. Watson & Son's, Atlas bronze. They have made a large number of propellers for various well-known firms, as well as the British Admiralty, with entirely satisfactory results. A bar out from a casting and tested lately by Messrs. Stanger & Co., of London, gave 48½ tons tensile strength with 20 per cent. elongation. After leaving Sunderland by the early morning tide, the compasses of the *Westmeath* were adjusted, and during the early forenoon a large party of ladies and gentlemen were taken on board by the attending tug, including Mr. R. M. Hudson, junr., Mr. Lindus Hudson, Mr. Graham, the owners' marine superintendent, and Captain Johnson, who will command the vessel. Mr. Graham has superintended the building of the steamer together with Captain Johnson. The builders were represented by Mr. G. B. Hunter, the head of the firm. The builders of the machinery were represented by their manager, Mr. Wallis. The trial trip was accomplished in charming weather, and everything on board went off very satisfactorily, the mean speed of the vessel on the measured mile being at the rate of  $12\frac{1}{2}$  knots per hour, the machinery working in the smoothest possible manner. On the completion of the trial trip the visitors were re-embarked on the tug, and the *Westmeath* headed southwards on her way to New Caledonia, where she is chartered for a cargo of nickel ore.

**Vasco.**—On Saturday, September 7th, the s.s. *Vasco*, built by Messrs. Furness, Withy & Co., Limited, went on her trial trip in Hartlepool Bay, and had a most successful run, a speed of 11 knots being attained. The vessel is a substantial type of a modern cargo boat, measuring well on to 300 ft. in length, and has been specially designed for the heavy deadweight trade. She is classed under the British Corporation rules, which embody many important features in connection with the distribution of strength in the construction of the ship.



This classification seems to be rapidly gaining favour with shipowners, this being the second vessel built for Messrs. Wilson this year by Messrs. Furness, Withy & Co., Limited, under the British Corporation rules. The shell-plating of this vessel is in exceptionally long lengths, some of the shell plates being 32 ft. long, which gives greater strength and dispenses with a large number of butts or breaking points. The engines and boilers have been fitted by Messrs. T. Richardson & Sons, Limited, and are of the triple-expansion type, having cylinders 20½ in., 33 in., and 56 in. by 36 in. stroke, with two large boilers arranged for a working pressure of 180 lbs. During the trial the engines worked very smoothly. The owners were represented on board the vessel by Mr. Wilkins and Mr. Spear. Messrs. Wilson's surveyors, under whose supervision the ship and engines have been built. The vessel is under the command of Captain Neal.

**Goldenfels.**—On September 9th the s.s. *Goldenfels* went for a trial trip off the mouth of the Tyne. This steamer has been constructed by Messrs. Wigham Richardson & Co. at their Neptune Works, Newcastle-on-Tyne, to the order of the Deutsche Dampfschiffahrts Gesellschaft Hansa, of Bremen, and is fitted with engines of the self-balanced quadruple-expansion type (Schlick & Tweedy's patent), working at 215 lbs. pressure. During the trial trip the machinery worked without the slightest hitch, giving satisfaction to all concerned, and driving the vessel at a mean speed of 11½ knots.

**Yagla.**—On September 11th the handsome new steam yacht *Yagla*, built to the designs of Mr. G. L. Watson by Messrs. D. & W. Henderson for Baron Nathaniel de Rothschild, of Theresianumgasse, Vienna, went down the river and moored for the night in Gourock Bay. She is 1,049 tons yacht measurement, is 236'0 ft. on the load water line, and 240'5 ft. between perpendiculars. The builders supplied her with triple-expansion engines of great power, cylinders 23 in., 38 in. and 64 in., with a 36 in. stroke, and steam pressure 160 lbs.

**Dayspring.**—On September 11th the new mission steamer *Dayspring* recently launched from the yard of Messrs. Mackie & Thomson, Govan, went down the river on her trial trip. She is an auxiliary screw steamer of about 850 tons gross, built expressly for mission purposes among the New Hebrides, and to the order of the John G. Paton Mission Committee. She is handsomely and comfortably fitted up for the accommodation of 30 missionaries besides her crew. The engines, which are triple-expansion, and of 850 I.H.P., are by Messrs. Hall-Brown, Buttery & Co., Govan, and have been constructed for a working pressure of 200 lbs. The steamer has a patent feathering propeller with two blades, and has been provided by Lord Kelvin with one of his patent compasses. Amongst those present at the trial were the Rev. James Paton, B.A., and Mrs. Paton; Mr. R. M. Colquhoun, honorary secretary for Scotland, of the John G. Paton Missionary Fund; Mr. Black, Belfast, representative of the Y.M.C.A. of Ireland; Mr. George Macfarlane, Mr. Alston, Mr. and Mrs. Hall-Brown, Mr. Colin Houston, Jas. Alward, of Grimsby; Mr. and Mrs. W. A. Mackie and Miss Mackie, Mrs. Mackie, sen., and Miss Mackie; Mr. and Mrs. John Mackie, Mr. R. H. B. Thomson, &c. Apologies were received from Lord and Lady Overtoun, but a contingent of their party were present at the early part of the proceedings, viz., Mr. M'Lure, Miss M'Lure, and Mr. White. Notwithstanding the stormy weather, an enjoyable day was spent by all on board, and the vessel behaved admirably. A mean speed on the measured mile of about 10½ knots was obtained, a result which was considered highly satisfactory. The usual toasts were proposed and responded to.

**Manoel Victorino.**—On Tuesday, September 17th, the *Manoel Victorino*, a small passenger and cargo steamer, built by Messrs. Craig, Taylor & Co., of the Thornaby Shipbuilding Yard, was taken to sea for her trial trip, which proved very successful in every way. The engines have been fitted by Messrs. Westgarth, English & Co., Middlesbrough, and the guaranteed speed of 10 knots was rather exceeded, the representatives of the owners being highly pleased with the result. The dimensions of the vessel are 140 ft. by 24 ft. by 9 ft. 5 in. depth, moulded. The builders entertained their entire staff with their wives and friends at the trip, numbering upwards of one hundred. The vessel left Stockton at seven o'clock in the morning and did not return until about 11.30 at night. The weather kept fine,

although there was rather a strong wind blowing, but a most enjoyable day was spent, a band of music being also in attendance. Both the ship and engines have been built under the superintendence of Mr. John Donald, of Bahia.

**Guillermo Lopez.**—On Thursday, September 19th, the s.s. *Guillermo Lopez*, built by Sir Raylton Dixon & Co., Middlesbrough, to the order of Messrs. Hawker, Somerville & Co., of Liverpool, for friends in Habana, left Cleveland Dockyard under the command of Captain de Egurola for the purpose of testing her speed and the working of the special machinery with which she has been fitted. She is a twin-screw steel steamer specially designed for passenger traffic in the West Indies. The principal dimensions are:—Length, 140 ft. 6 in.; breadth, 26 ft.; depth, moulded, 11 ft.; the first class passenger accommodation being handsomely fitted up in bridge house. The electric light installation is most complete the vessel being lighted throughout, including side and masthead lights, by electricity, a powerful search-light being also fitted. The steamer is also provided with towing bridges and gear, and a large salvage pump to be used for salvage purposes. Powerful triple-expansion engines with twin-screws have been fitted by Messrs. Westgarth, English & Co., Middlesbrough, having cylinders 13 in., 20 in. and 32 in. by 20 in. stroke, and supplied with steam from a large single-ended steel boiler working at 160 lbs. pressure. A number of friends, including Mr. Genn, who represented the owners, Captain Aldecocoe, etc., were on board during the trial trip, which was most satisfactory, the machinery etc., working without the slightest hitch and a mean speed of 13 knots was easily attained.

**Glenroy.**—On Saturday, September 21st, the steam trawler *Glenroy*, left the Cleveland Dockyard of Sir Raylton Dixon & Co., Middlesbrough, for the customary trial of machinery, &c. She has been built to the order of Messrs. Ellis & Johnson, Grimsby, for the North Sea fishing trade, and is fitted with the most recent improved appliances for her particular work. Her principal dimensions are:—Length, 100 ft. 8 in.; beam, 20 ft. 5 in.; depth, moulded, 11 ft. 8 in. Triple-expansion engines have been fitted by Messrs. The North Eastern Marine Engineering Co., Limited, of Sunderland, the cylinders being 11 in., 17 in., and 30 in., by 21 in. stroke, with a large steel boiler working at 160 lbs. pressure. During the trials everything worked most satisfactorily, and gave great satisfaction to all concerned. The vessel is commanded by Captain Halvorsen.

**Skate.**—H.M. torpedo catcher *Skate*, built by the Naval Armaments Co., Limited, Barrow, arrived at Greenock last month for the purpose of undergoing her official trials on the Firth. These proved eminently satisfactory, the final official run giving a mean speed of 29 knots.

**Sokol.**—The launch of the new torpedo-boat destroyer *Sokol* (English, *Hawk*), built by Messrs. Yarrow & Co. for the Russian Government, was, within the 24 hours of the vessel's leaving the launching ways, followed by her attaining, when going through a series of preliminary trials, a speed which is believed to be unprecedented in the records of any similar vessels in this or any other country. She proceeded down the Thames, and on reaching the Maplins, increasing speed trials were undergone, giving as results:—First speed, 25'8; second, 27'8; third, 29'26; fourth, 30'285 knots, these being in each case the mean speed attained on each set of runs made, the highest speed being realised with 416 revolutions of the engines per minute and a steam pressure of 170 lbs. per square inch at the boilers, the air pressure never exceeding 1'3-16 in. of water. It is stated that the propelling machinery worked admirably, and that the water-tube boilers gave ample steam.

**Kittiwake.**—There has lately left the Clyde for the West Hebrides a small yacht, which, so far as motive power is concerned, is of a distinctly novel type. The boat is the *Kittiwake*, belonging to Mr. George Shaw, Glasgow, and is a pleasure yacht, designed and built by Messrs. Machan & Sons, Glasgow. She is schooner rigged. The hull is entirely of steel, and is divided into three watertight compartments by transverse bulkheads. The dimensions of the vessel are:—L.W.L., 50 ft.; overall, 61 ft.; beam, moulded, 9 ft. 9 in.; depth, moulded, 7 ft. The special feature is the machinery, which is of Messrs. Priestman Bros.' marine type oil engine, and of about 20 H.P., and which, with tanks of sufficient capacity for a run of 1,000 miles, occupies a space of only 6 ft. fore and aft. In addition to the space saved by the motor, which is considerable, there are none of the inconveniences in the shape of heat or smoke and the necessity of frequently re-coaling inseparable from the

use in a boat of the size of the ordinary steam engine. The engines, which were put in as auxiliary, were guaranteed to give a speed of six miles, but on the measured mile seven were attained, and with everything in proper trim there is more than a possibility of another half-mile. The engine worked perfectly on trial; there was little vibration, and the smell of the oil fuel was imperceptible. For a boat of the size the accommodation is exceptional. At the after end there is a saloon, 8 ft. 6 in. by 7 ft. 6 in.; forward a state-room, 7 ft. 6 in. long by 8 ft., and forward of the engine-room a dining-saloon 9 ft. long. There is a central portable bulkhead for the division of the state-room when necessary. In the fore-castle there are berths for three men. The machinery, which requires very little attention when running, is under the control of the steersman.

**Pectan.**—This vessel, just completed and ready for sea, has been inspected by Alderman and Sheriff Samuel, of the City of London, and Mr. Fortescue Flannery, M.P., together with other gentlemen interested. The *Pectan* is a splendid steel screw steamer, built for Messrs. M. Samuel & Co., of London, for the bulk petroleum trade to the East through the Suez Canal, by Messrs. Wm. Gray & Co., Limited, West Hartlepool. She is the largest bulk oil steamer afloat, takes Lloyd's highest class, and her dimensions are:—Length over all, 388 ft.; breadth, extreme, 48 ft.; depth, 81 ft. 6 in.; with full poop, bridge, and fore-castle. The engine and boiler rooms are in the after part of the vessel, and underneath them there is a double bottom for water ballast. The forward and after peaks and deep tank in the forehold are also fitted for water ballast for trimming purposes. Forward of the boiler-room there are eleven strong transverse bulkheads, and also a very strong fore and aft bulkhead from the keel to the main deck. Altogether there are fifteen separate oil tanks. These oil tanks are separated from the boiler-room and bunkers aft, and from the cargo hold forward by large cofferdams, which are carried to the upper deck in each case, and which can be filled with water or used for carrying fish oil, or for ordinary cargo when required, and they are under the control of special and separate pumps. Expansion trunks are carried up from each oil compartment to allow the oil to rise and fall with varying temperature. These trunks, in conjunction with large hatchways, will be used for loading general cargo. Two powerful pumps are fitted in the pump-room amidships for discharging the oil cargo. They will also pump water from the sea to fill the oil tanks when required for water ballast. When the oil cargo has been discharged the tanks will be cleaned and adapted to receive general cargo by special means provided. A powerful fan is fitted capable of exhausting the air from each tank in ten minutes, in order to thoroughly ventilate the compartment when filled with general cargo, the exhaust air being delivered through a cowl a good way above deck. The vessel is fitted throughout with an electric light installation by Messrs. Clarke, Chapman & Co., of Newcastle-on Tyne, lighting the whole of the cabin, engine and boiler rooms, galley, chart and wheelhouse, binnacle and telegraphs, &c. In addition she has a 20 in. projector and the necessary lighting for navigating the Suez Canal at night. In order that all parts of the ship may be thoroughly examined after cargo has been discharged, she is provided with a number of portable lamps. The cabin, fore-castle, and petty officers' rooms are all heated by steam, so as to avoid any risk by fire. The accommodation of captain, officers, and the saloon are amidships, the engineers' rooms in a large house on the deck aft, and the crew forward. A patent steam steering gear has been fitted and screw gear aft, patent steam windlass, multitubular donkey boilers, patent stockless anchors, and in addition to all necessary fittings and outfit for the oil trade, there is a complete outfit for working general cargoes, including eight steam winches with derricks to each. Three masts are fitted and neatly rigged, and awnings all fore and aft for the eastern climate. Great care has been taken to ensure strong and sound work. The rivetting is closely spaced in shell-plating, decks and bulkheads, and in order to reduce as far as possible the number of joints in way of the oil tanks, the shell-plates are extra long. The vessel is fitted with a very powerful set of triple-expansion engines, of the well-known type manufactured at the Central Marine Engine Works of William Gray & Co., Limited. The cylinders are 27½ in., 48½ in., and 73 in. in diameter respectively, and 48 in. stroke. An extra large amount of boiler power is also provided in the shape of three large single-ended boilers,

working at a pressure of 160 lbs. per square inch. Increased safety is ensured by lacing two of the boilers with their backs towards the cofferdam, removing the heat of the stokehole a considerable distance from the bulkheads. The engines are furnished with all the latest improvements, the engine-room being also provided with one of Mudd's patent feed-water evaporators, which is designed on a plan facilitating cleaning and examination. The vessel left the harbour about 5 a.m. on Saturday, September 21st, having on Board Capt. Coundon, the marine superintendent for the owners; Mr. Baggallay, of the firm of Flannery, Baggallay & Johnson, Inspecting Engineers; Capt. J. H. Murrell, representing the shipbuilders; Mr. T. Mudd, representing the Central Marine Engine Works; Mr. Baird and Mr. Berry, the compass adjusters. The engines were run easy for a couple of hours to permit of the accurate adjustment of the compasses, after which they were opened out to full speed ahead and the log put overboard. At 9 o'clock the vessel returned, the speed shown by the log being 11 knots per hour. Everything in the engine-room worked in the most perfect manner possible, there being no heating perceptible in any of the bearings and no water applied. The boilers and all steam joints were absolutely steamtight, and the trial proved in every way highly satisfactory to the owners' representatives on board the ship. The *Pectan* is the seventh oil steamer built by Messrs. Wm. Gray & Co. and engined at the Central Engine Works for Messrs. M. Samuel & Co., and is a sister ship to the *Telena*, now building. These two vessels are developed on the experience of the former ones, and are pronounced by the experts to be a distinct step in advance in many matters of detail, and in all arrangements for the safe carrying, the rapid taking on board and discharging of bulk oil cargoes. Immediately on the conclusion of the trial the vessel proceeded south on her voyage to Batoum to take in her first cargo of oil for the East. This handsome vessel has attracted an unusual amount of attention in shipping circles owing to her large size, and the many special features embodied in her design and equipment. She reflects the greatest credit alike on her enterprising owners, the professional superintendents, Messrs. Flannery, Baggallay, & Johnson, under whose supervision she has been constructed, and upon the shipbuilders and engineers who have carried out the work. With every facility on board for her special trade, and with the most modern and economical machinery the present day can produce, she is sure to prove a most valuable and profitable addition to the great fleet of oil-carrying steamers owned by Messrs. M. Samuel & Co.

## Reviews.

*The Manufacture of Explosives.* By Oscar Guttman. London: Whittaker & Co. 1895.

THIS work is one of the most extensive which has yet appeared in the Specialist series. It deals with a very wide subject, for, nowadays, the names of the various explosives in use for different purposes is legion. The intention of the book is to afford to manufacturers and experts details of the latest practice in the science and art of manufacture. The extent of the class whom the author caters for is shown by the fact that there are at least fifty thousand workmen in Europe engaged in the task of manufacturing explosives. On account of the numerous people who are acquainted with the processes—or some of them—of manufacturing the various destructive compounds dealt with in the volume, the writer feels that he is committing no indiscretion in publishing his book. He thinks that it may be urged that he is putting the means of destruction into the hands of anarchists, and that, on that account, the publication of the work may be reckoned inadvisable and inopportune. But, as he says, the book contains nothing new, and will not on that account afford any facilities to the enemies of society. He might, we think, have given another and equally valid reason why his work cannot do the public any injury. It is this: The anarchist must of necessity work secretly, and produce small quantities of explosives at a time, in order that what he is about may not be discovered. To him the apparatus described by Mr. Guttman designed for the economical production of large quantities of explosive will be practically useless. The large and expensive installations recommended would merely cause his practices to be discovered.

The two volumes, however, are of deep and of almost fascinating interest. The history of the early manufacture and use of gunpowder, as far as is known, is laid before us, and we see how the fashions as to the proper proportions of the three ingredients changed with the centuries, and with the practice of various countries. Then the chemical properties of the ingredients are gone into. We may say, once and for all, that in dealing with every process in the book, the practice of every nation, with its special apparatus and methods of packing the products, are carefully explained for the student. The results of innumerable experiments are tabulated and arranged. For example, the charcoal from no less than seventy-two sorts of wood (besides straws and pulps), are examined as to weight before and after drying and charring, and the amount of resultant charcoal in each case is recorded. Then the various other substances which are used as absorbents are gone into. These are now most numerous, including earths, cotton, and glycerine amongst others. A large amount of attention is given to the methods of manufacturing nitric acid. At page 69 the author gives us the essentials whose presence is necessary to make an explosive practically useful. As he rightly observes, there are many substances which explode which are of no practical significance. He then goes on to discuss the general qualities of explosives, and devotes the remainder of his first volume to the subject of Black Powder, telling us of its properties, manufacture, and chemical attributes.

The second volume deals with the manufacture of the other and more recent kinds of explosives, and with the apparatus for testing them. An appendix gives the various orders in Council relating to the testing of explosives, and to the electric lighting installations of factories where they are manufactured. Briefly, we have said enough, though the subject is, perhaps, wider than those of many of the other volumes included in the Specialist series, and though it is one which goes through an almost virgin field, this book is by no means less exhaustive in its treatment than are its predecessors in the series. It is upwards of twenty years since the last previous contribution to the literature of explosives was made. A vast amount of progress has been made since then. But it is safe to say that, save for the advance which science is sure to make at the close of the nineteenth century, there is now no room for another book on the subject. We feel assured, too, that provision for the record and discussion of the improvements and new discoveries of many years to come will be found in the future editions of the present volumes, for all manufacturers of explosives and most practical chemists will find the need of this most thorough and laborious work.

*Screw Propellers and Marine Propulsion.* By I. McKim Chase, M.E. New York: John Wiley & Sons. London: Gay & Bird. 1895.

THIS volume is divided into two parts. Of these the former deals with the subject of screw propellers, and it is in respect of this that the work of writing was originally undertaken, the author wishing, as he tells us, to provide a book for the use of workmen engaged in the construction of screws. The latter part of the volume deals with the more general subject of marine propulsion. This, whilst interesting those for whom the first part is written, will also afford instruction to a wider class of readers who go more deeply into the science of marine engineering and shipbuilding.

The book contains a number of excellent plates, explanatory of the method of designing and executing the various types of screws known on either side of the Atlantic, including lifting and feathering screws and the Mallory propeller, which latter was fitted to the United States torpedo-boat *Alarm*. He also illustrates the reversible propeller of Mr. Robert McGlasson, which has from time to time been discussed in the columns of this journal. A curious printer's error must here be noticed. Plate xviii. is headed "Steam Lines, etc." The heading is copied four times on following pages and appears also in the index, and it is always written thus. Yet what the plate refers to, and what the author wishes to discuss, is not steam lines, but stream lines. Under this head the author gives us a clear *résumé* of the state of knowledge on the point, and quotes, with due acknowledgment, the formulae of Mr. R. Sennett regarding marine propulsion, and also that of Mr. Seaton, whereby the latter arrives at the measure of propelling force in any given case. But when all is said and done, Mr. Chase is probably correct when he writes that "It is very doubtful whether there will ever be devised a formula that can be universally applied to determine the best form and the

most advantageous dimensions for a screw propeller under any given set of conditions."

The review, however, of what is known is very full, and it is clear that the author has gone through everything that has been written on this most difficult subject, and has examined also a good deal of the modern practice on trials of both American and British warships, with a view to testing the received theories and formulae. Even though the subject seem impossible of reduction to a set of universal formulae, it is well that statistics and theories should be accumulated, for it is by the work of such patient and laborious students, toiling in the face of adverse and apparently impossible conditions, that science advances and brings the unknown into the store of every-day information. That the book will be useful to the engineer and shipbuilder admits of no manner of doubt.

*Technical Dictionary of Sea Terms, Phrases and Words.* (English-French and French-English.) By William Pirrie. London: Crosby Lockwood & Co. 1895.

MR. PIRRIE is the Continental superintendent engineer of the African Steamship Line, and as such has been in a position to gather French and English equivalents for a very large number of technical terms, as well on deck, in the wheel-house, and aloft, as in the engine-room. This arrangement—without which the finest storehouse of information of such a kind as that before us would be useless—is very excellent. The phrases are arranged under the catch-word which plays the chief part in them, and the book is one that will be invaluable to all those connected with shipbuilding and management, whether actively or from the literary point of view. For a man may be a very good French scholar and be hopelessly posed when confronted with such technical terms as are in common use, and no ordinary dictionary will be of the least avail to him.

*Walks in Belgium.* By Percy Lindley. London: 30, Fleet Street. 1895.

THIS is a little pamphlet issued under the auspices of the Great Eastern Railway. It shows the holiday maker how, for a very trifling cost, he can make himself acquainted with some of the most famous historical places in Europe, for Belgium has long been the "Cockpit of Europe," and battlefields, whose fame will endure as long as there is history, are to be met with in every part of the little country. Though Belgium is so close to our shores and so cheaply and easily reached—(the editor shows us how a week can be spent there for a five-pound note without any stinting oneself)—it is by no means well known to Englishmen outside the beaten track. In the towns where English and Americans do penetrate there is no difficulty to be apprehended on account of the language, for all the people with whom the traveller is thrown in contact speak English. He will, however, soon find that it is not difficult to make oneself understood anywhere as long as one can pay one's way. Yet it will be found that the architecture and customs of Belgium, as well as of the remoter places herein mentioned (such as the Grand Duchy of Luxemburg and the Ardennes), are all marked very different to those which prevail on this side of the Channel. Some things will strike us as better than our own, some as the reverse, perhaps. But in any case travelling expands the mind by showing us that we are not all-important, as well as benefits the health by the change of scene. Perhaps this little book will induce some readers to take their next holiday in the Low Countries, and they will, if so minded, find every facility afforded by this railway company, which makes a special feature of its tickets and tours, arranged to suit real requirements of travellers, not the convenience of ticket collectors, whilst its steamers are the best which cross the Channel. They are, strangely enough as it seems in these days, British built and British manned, and are almost the only ships which are in the trade which are not constantly appearing in the casualty list as having had breakdowns of machinery. This absence of minor accident helps to punctuality, and punctuality means the favour of passengers. The little volume is well illustrated, and is well worth the modest sum of sixpence, even to the stay-at-homes.

*The Work's Manager Handbook.*—By Walter S. Hutton. London: Crosby Lockwood & Co. 1895.

THE fifth edition of this standard work is now before us. For the fourth edition the book was in a large part re-written and the pre-

sent is therefore quite up to date both in form and substance. There has been revision and addition, but there was very little to add. The number of books containing formulæ and rules, tables and data for the engineer and all connected with his profession, are legion. But there is no volume which, for the class for which it is intended, can hope to compete with Mr. Hutton's book. He seems to give everything that is wanted and nothing that is not. His scope is necessarily wider than that of purely engineering books. He has to give little details as to builder's work, as to the routine of the counting-house, and as to the practice of merchants and lawyers, and all this he does, and does well. He even gives a few important memoranda on meteorological subjects. The book needs no great recommendation from us. It has been tried and tried thoroughly, and those who have tried it have appreciated it and asked for new editions. All the reviewer has to do under such circumstances is to notify those who are waiting for copies that such are obtainable, and that as far as he is able to see, the new edition is worthy of the reputation established by its predecessors. This we can truthfully and emphatically do.

#### Modern Wood Working Machinery. By J. Stafford Ransome.

London: William Rider & Sons, Limited. 1895.

This little work is the sixth volume of Messrs. Rider's Technical Series and it is a book that is very likely to prove of use to others than those for whose needs it is more especially intended. It gives a very full and complete account of the various appliances required for the felling of timber, and for the purpose of its subsequent treatment to fit it for the many purposes for which it is commercially requisite. Mr. Ransome has examined not only all the machinery which is turned out by English firms, but he knows a great deal about the various specialities of foreigners. The whole of his experience seems to go to prove that in this special department, as in most others, if English goods cost more they are, even at the higher price, better investments than the cheap foreign articles. Besides describing the machinery he gives a good deal of sound advice to woodworkers as to the establishment and management of their business, and gives very excellent reasons why the best machinery, well kept and well looked after, will be found in the end to be the best investment for the capital put into the business. "Whatever is worth doing at all, is worth doing well," is an old proverb, but it seems necessary here as in many other businesses to inculcate the old maxim. The chapters on motive power are exceedingly well worth reading. Also that on refuse collecting machinery, which shows how human ingenuity has converted the shavings and sawdust, once an expense to collect and an ever-present source of danger from fire, into a very useful by-product, which tends to keep down the coal bill, and that without necessitating the employment of extra hands. This is possible through an ingenious invention, the Cyclone dust collector. We can safely recommend the volume to our readers as one that deals thoroughly with the subject upon which it touches.

## Correspondence.

[It must be understood that, in giving insertion to communications under this heading, we do not in any way pledge ourselves to the opinions preferred therein. We will with pleasure insert any letters likely to benefit our readers either from their intrinsic value or as being calculated to promote such discussion as will elicit facts valuable from their being the result of practical experience.—Ed. M. E.]

### SHIP'S LIFEBOAT.

To the Editor of THE MARINE ENGINEER.

SIR,—In your issue of September 1st (page 229) in commenting upon the enquiries into the loss of the *Elbe* and upon the recommendations as to boat drill, etc., you conclude your remarks by the following: "What is wanted is some invention whereby boats can be launched when the ship has gone over on her beam ends, and this at present seems beyond the ingenuity of inventors."

It may be of interest to you to learn that a ship's lifeboat has been invented, in which a special feature has been made of the launching, which is effected in three or four minutes, by a simple contrivance under the control of one man, even when the

ship is so listed as to render the launching of the ordinary boats an impossibility, even though other conditions of weather, etc., may be favourable.

In addition to the above the boat possesses the unusual feature of being unsinkable, and the possibility of capsizing is very remote. Should, however, the latter occur, she is immediately self-righting.

There are other advantages possessed by the boat of equal importance with those referred to.

Yours truly,  
E.

September 23rd, 1895.

### Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from August 8th to September 12th, 1895.

- 14891 S. Boswell. Folding landing-net shafts.
- 14892 T. H., G., and L. Gardner. Governors.
- 14905 T. E. B. Phillips. Screw propellers.
- 14927 O. A. Ringbom. Steam engines and pumps.
- 14952 J. V. Neill. Steam traps.
- 14957 J. W. Earnshaw and W. E. Gibbs. Water gauges.
- 15010 A. Huet. Steam or vapour generators.
- 15036 M. Picard. Ships.
- 15045 F. W. Lanchoester. Oil motor engines.
- 15055 E. Sadler. Fire or water-tube steam boiler.
- 15081 A. A. Cawkwell. Water-tube steam boilers.
- 15118 M. Gledhill. Ships' propellers.
- 15141 J. Davies. Perpetual deck engine.
- 15188 R. Richardson. Direct-acting steam pumps.
- 15209 G. L. Alward. Winches.
- 15217 R. Haddan (G. Blumcke, United States). Life-boats.
- 15221 J. T. Halsey. Steam engines.
- 15229 G. E. Hesse and N. G. de Foa. Submarine guns.
- 15238 O. Imray (J. McGregor and J. L. Jackson, United States). Boilers.
- 15244 B. H. N. Lindley. Stuffing boxes.
- 15263 G. Johnson. Steam boilers.
- 15265 J. R. Badger and W. Badger. Steam trap.
- 15270 D. B. Downie. Anchors.
- 15277 J. Inches and S. Barber. Winches.
- 15278 J. Raab. Valves.
- 15279 C. Courtney. Valve.
- 15291 W. Lonholdt. Furnaces for steam generators.
- 15293 W. E. Carmont. Appliance to prevent boats capsizing.
- 15298 M. Beckley and C. E. Bocquet. Automatic regulator to steam boilers.
- 15302 G. R. Ford. Scrapers for boiler flues, &c.
- 15304 G. H. Ford. Collecting dirt in steam boilers.
- 15382 F. H. Tyacke and B. S. Brownlow. Feed-water heater.
- 15399 J. Johnson. Lubricators.
- 15403 J. S., R. D., W. D., and H. C. Cundall. Oil motor engines.
- 15416 T. W. Baker. Apparatus for heating feed-water.
- 15421 F. L. Rovednio. Torpedo tender for war vessels.
- 15426 S. Taylor. Compound metallic plates.
- 15443 E. Thomas. Apparatus for launching boats.
- 15446 A. Wilson and F. Stubbs. Armour plates.
- 15454 G. S. Ullathorne and C. E. Monkhouse. Steam generators.
- 15475 T. Greenwood. Valve motions of steam engines.
- 15498 H. W. J. Wilkinson. Propulsion of boats, &c.
- 15502 J. Inches. Winches.
- 15507 C. B. Lawes. Stretchers for rowing boats.
- 15522 W. F. Fair. Rowing boats.
- 15549 A. G. Mumford. Steam generators.
- 15570 G. E. J. Moody. Attaching trawl-nets to other boards.
- 15582 F. Hughes. Doors for use on ships and elsewhere.
- 15590 H. P. Ranger. Setting of steam boilers, &c.
- 15627 E. Elliott. Tubes.
- 15658 J. B. Furneaux and A. Horne. Balanced slide valves.
- 15682 B. J. Wilkinson. Oars and sculls.
- 15685 D. H. Williams. Valve gear for steam engines.
- 15687 J. T. Cocran, E. Crompton, and E. C. Johnston. Centre boards for yachts.

- 15698 F. O. Prince. Furnace bars.  
 16724 S. H. Stubbs. Steam traps for separating and ejecting water.  
 15755 R. P. Saunders (O. von Chrismar, South America). Propelling vessels.  
 15774 W. Tharme. Propellers for navigable vessels.  
 15814 A. Vogelsang. Screw propellers.  
 15825 C. T. Miaczynski and R. L. Paciata. Furnaces.  
 15837 J. A. Deport. Armour-plated turrets.  
 15841 J. D. Campbell. Valves for high-speed engines.  
 15851 P. Purcell and W. A. Warwick. Indicating wrecks.  
 15872 G. Tyzack. Apparatus for loading cargo.  
 15938 H. O. Ashlin. Furnace tubes.  
 15953 W. P. Thompson (R. Ewing, United States). Self-bailing boats.  
 15967 F. Nordhausen. Construction of ships.  
 15977 B. Welford and P. Mitchinson. Ships' winches.  
 16013 E. Lagosse. Boilers.  
 16027 J. Whyte. Self-lubricating packing for engines.  
 16038 C. Owen. Steamship propeller.  
 16069 W. A. Granger. Induced draught for furnaces.  
 16098 A. Ducasble, E. Fasquelle and C. W. Firnhaber. Speed indicator.  
 16113 W. I. Last. Heating engine cylinders.  
 16148 J. Cameron and J. King. Water gauges.  
 16157 E. J. Clubbe and A. W. Southey. Internal combustion engines.  
 16184 S. Wallace. Communication between ships at sea.  
 16212 W. A. Martin. Furnace grates for marine boilers.  
 16219 M. S. Meldrum and T. F. Adamson. Bulwark ports.  
 16225 W. L. Bone. Low-water alarm valves.  
 16226 B. Lebrun. Smoke-consuming furnaces.  
 16270 R. Elliott. Weldless tubes.  
 16320 K. Davey. Steam engine.  
 16329 F. Reddaway. Flexible armoured hose.  
 16377 W. Lees. Steam valves.  
 16388 O. Pexhel. Slide valve gear.  
 16405 W. A. Stevens, R. A. Barker, and W. J. Saveall. Governing steam motors.  
 16413 P. P. Sevine. Steering ships.  
 16448 J. Galloway. Steam traps.  
 16463 P. Loos. Vertical steam boilers.  
 16478 G. Green and G. Portens. Metallic packing.  
 16529 W. H. Fitzgerald. Boats, &c.  
 16542 A. E. Stukley and T. Atkinson. Regulating steam supply.  
 16552 H. P. Trusman. Internal combustion engines.  
 16610 J. J. Meldrum, T. F. Meldrum, and J. W. Meldrum. Steam generators, &c.  
 16625 H. Stanbridge. Apparatus for deep-sea diving.  
 16654 J. F. R. Knobloch. Tidal motors.  
 16665 A. S. Walker. Oar for rowing boats, &c.  
 16668 J. S. D. Shanks, T. Harrison, and J. MacCormac. Furnaces of steam boilers.  
 16681 T. G. Messenger. Fixing tubes in boilers, &c.  
 16685 G. Pirnie. Cranks for engines.  
 16686 G. Wilson. Gland packing.  
 16698 J. R. Mathias. Opening watertight doors.  
 16707 F. W. Greengrass. Safety appliance for boilers.  
 16723 A. Cocke. Stuffing boxes of piston rods.  
 16771 T. R. Lee and J. G. Campbell. Construction of ships.  
 16780 O. D. Abel (R. Wolf, Germany). Superheating steam.  
 16795 L. M. V. Blanc. Steam boilers.  
 16817 J. C. Bull. Screw propellers.  
 16822 D. Black and W. Stewart. Steam engine indicators.  
 16850 R. Simon. Furnace bars.  
 16887 F. W. Crossley and J. Atkinson. Screw propellers.  
 16903 J. A. Fairbanks. Bell buoys.  
 16919 E. T. Thomas. Cleaning ships and buildings.  
 16933 J. Snowden. Gallows for trawl nets.  
 16934 W. P. Thompson (H. J. Combes, United States). Multiple cylinder engines.  
 16988 W. A. Pitt. Engines.  
 16948 R. Sykes. Anchors.  
 16972 C. C. Pruden. Water-tube steam boilers.  
 16977 A. James. Braided endless tubes.  
 16985 W. Houghton and J. Lindsay. Pipe wrench.  
 16991 J. B. Furneaux. Expansion governors.  
 17032 S. H. Wright. Valves.

## BOARD OF TRADE EXAMINATIONS.

NOTE.—1C denotes First Class; 2C, Second Class.

August 24th, 1895.

Allan, John G. 2C Liverpool  
 Blandon, Wm. 1C Cardiff  
 Cameron, Hugh 1C London  
 Careless, L. J. ... 2C  
 Clark, William 2C Dundee  
 Davies, T. O. ... 2C Cardiff  
 Forbes, John ... 1C Glasgow  
 Geen, G. H. ... 2C Cardiff  
 Hannan, J. ... 2C Glasgow  
 Kingsley, John 2C Liverpool  
 Lennox, G. ... 1C Glasgow  
 Lyons, James ... 1C Lond'derry  
 McGregor, A. J. 1C Glasgow  
 McGregor, W. L. 1C  
 Orohar, Wm. ... 1C Dundee  
 Pairman, G. ... 2C Glasgow  
 Parker, A. I. ... 1C London  
 Pearse, F. W. ... 1C Cardiff  
 Robotham, W. 1C  
 Rogers, H. J. S. 1C  
 Sennington, S. 1C S'th'pton  
 Turner, A. B. ... 1C Glasgow  
 Weir, Wm. ... 1C Lond'derry  
 Wylie, W. A. ... 1C Glasgow

August 31st, 1895.

Adamson, J. F. 1C Liverpool  
 Baillie, John ... 1C Aberdeen  
 Burgess, John ... 2C London  
 Carr, Thomas ... 2C N. Shields  
 Davies, William 2C  
 Dence, Ernest ... 2C London  
 Dorward, Alex. 2C Liverpool  
 Dudgeon, John 1C Sun'land  
 Gillings, Wm. ... 2C N. Shields  
 Ginders, R. C. ... 1C Liverpool  
 Glen, William ... 1C  
 Glenwright, W. 2C N. Shields  
 Gray, W. J. ... 2C Aberdeen  
 Harland, F. W. 2C N. Shields  
 Harrison, Wm. 1C Aberdeen  
 Hodgson, Wm. 2C Liverpool  
 Holden, James 2C  
 Hollocombe, W. 1C London  
 Hunter, Luke ... 2C N. Shields  
 Joell, Robert R. 2C  
 Jones, George ... 1C  
 Jones, Richard 2C  
 Lowes, J. A. ... 2C Sun'land  
 Marshall, T. C. 2C N. Shields  
 McCullum, A. 2C Liverpool  
 McMath, A. M. 1C Aberdeen  
 Milne, Alex. ... 2C  
 Murison, F. ... 1C  
 Nicholson, Jas. ... 1C N. Shields  
 Ord, Henry D. 1C  
 Orr, Thomas R. 2C London  
 Parker, Walter ... 1C Hull  
 Passman Thos. ... 2C N. Shields  
 Pearson, Willie 2C  
 Perna, Cesar L. 2C  
 Porter, James ... 2C  
 Purves, Andrew 1C  
 Reed, John A. ... 1C  
 Robinson, A. ... 1C  
 Smith, Gabriel ... 1C Aberdeen  
 Smith John ... 2C N. Shields  
 Stoll, Joseph ... 2C  
 Tarn, Edward ... 2C  
 Vaux, John S. ... 1C  
 Waddleton, J. A. 1C  
 Waldie, Arthur 1C Aberdeen  
 Walworth, Chas. 1C N. Shields  
 Welton, Samuel 2C

Wilson, J. A. ... 1C Liverpool

September 7th, 1895.

Allan, W. ... 2C Glasgow  
 Bell, A. J. ... 1C Leith  
 Bishop, H. ... 1C Cardiff  
 Broughton, J. H. 1C Hull  
 Crichton, D. ... 1C Leith  
 Davidson, Hugh 2C Liverpool  
 Devaynes, A. ... 2C  
 Featonby, J. ... 1C Cardiff  
 Gale, William J. 2C Liverpool  
 Gordon, P. H. ... 2C Glasgow  
 Jordan, J. L. ... 2C  
 Kendall, N. H. ... 1C Cardiff  
 Kenshole, H. ... 1C  
 Laing, James ... 2C Glasgow  
 Law, Robert ... 1C  
 Lester, E. ... 2C London  
 Linden, A. ... 2C Cardiff  
 Macgregor, J. R. 2C Glasgow  
 McArthur, G. H. 2C Leith  
 McArthur, J. W. 2C Glasgow  
 Moore, William 1C  
 Mumby, Edwin 2C Hull  
 Munro, Colin ... 2C Glasgow  
 Parsey, B. ... 1C Cardiff  
 Pengelly, A. ... 2C  
 Pitt, R. W. ... 1C  
 Read, E. W. ... 2C  
 Reid, J. ... 2C Leith  
 Rintoul, J. ... 2C Glasgow  
 Robinson, Geo. ... 1C Liverpool  
 Salter, J. A. ... 2C  
 Service, William 1C Glasgow  
 Sinclair, P. B. ... 1C London  
 Sinclair, R. ... 1C Glasgow  
 Smith, E. D. ... 1C  
 Stakias, D. ... 2C Cardiff  
 Tanfield, Wm. ... 1C Hull  
 Thomas, J. ... 1C Leith  
 Wells, J. W. ... 1C Glasgow  
 Williams, Hugh 1C Liverpool  
 Williams, J. E. ... 2C Cardiff

September 14th, 1895.

Ball, Robert, ... 2C Liverpool  
 Beekel, Andrew 2C Cardiff  
 Brankston, A. ... 2C N. Shields  
 Bridger, John ... 1C Liverpool  
 Dinnim, J. H. 1C Cardiff  
 Fairman, S. C. 2C N. Shields  
 Fasting, George 2C Liverpool  
 Ferguson, Wm. 1C  
 Forbes, James 2C London  
 Grant, William 1C Greenock  
 Hamilton, L. ... 2C Dublin  
 Hardy, J. A. ... 2C N. Shields  
 Harris, David ... 1C Cardiff  
 Hay, George G. 2C Greenock  
 Holihan, Francis 2C Cardiff  
 Lindsay, T. ... 1C Liverpool  
 Lugton, W. J. ... 1C N. Shields  
 Maypee, H. G. 1C Greenock  
 Miller, George 2C N. Shields  
 Morgan, H. W. 2C  
 Palmer, F. W. 2C  
 Robertson, E. B. 2C Dundee  
 Rodger, J. A. ... 2C Dublin  
 Sanderson, Geo. 1C N. Shields  
 Seldon, T. F. ... 2C Cardiff  
 Spencer, Thos. 2C Liverpool  
 Thompson, A. ... 2C Dublin  
 Travis, F. A. ... 2C Cardiff  
 Wheeler, G. E. 2C Greenock  
 Young, Geo. V. 2C London



# The Marine Engineer.

LONDON, NOVEMBER 1, 1895.

BY the launch of the *Victorious*, which was successfully accomplished from the Chatham Dockyard on October 19th, a splendid successor to her prototype, the *Magnificent*, has now been well started on its way to completion, and it is to be hoped that its final completion and successful trials will equally rival the record time accomplished in the case of the *Magnificent* by the Royal Dockyards and Messrs. Penn & Sons, who put in the engines and boilers. We regret that in our notice in the last issue, of the completion of the *Magnificent*, we did not clearly give the Royal Dockyards the credit on their part of their comparatively speedy completion of the hull. The keel plate of the *Victorious* was laid on May 28th, 1894, so they must be again congratulated on the rate of completion in this case. As the *Victorious* is, it appears, the largest warship ever launched from the Dockyards, much care had to be taken in the arrangements for successfully putting her into the water. Her launching weight was about 5,500 tons, giving a pressure on every square foot of ground ways of  $2\frac{1}{2}$  tons, so that very substantial ways and cradle, which latter weighed nearly 300 tons, had to be provided. It is said that the cost of launching alone amounted to £2,000, and the greasing and lubrication ran into many tons of Russian tallow, soft soap, and train oil. The *Victorious* is 390 ft. in length, between perpendiculars, with a beam of 75 ft. and a mean water draught of 27 ft. 6 in. Her displacement at the load waterline will be about 15,000 tons, and she is to have two independent sets of engines supplied by Messrs. R. & W. Hawthorne, Leslie & Co., to develop 6,000 H.P. each set, estimated to produce a speed of  $17\frac{1}{2}$  knots. The engines are in separate engine-rooms and are triple-expansion with cylinders 40 in., 59 in., and 88 in. in diameter, all with a piston stroke of 51 in. Each set of engines is to drive a four-bladed screw propeller of 17 ft. diameter and 19 ft. 9 in. pitch, the boss and blades being of Admiralty gun-metal, and are to run at 100 revolutions a minute. No experiments as to boilers have been made in this ship, as they are eight single-ended four-furnaced cylindrical tubular boilers, made for a working pressure of 155 lbs. per square inch. The closed stokeholds are used with eight fans for forced draught. The vessel is lighted throughout by electricity.

THE Naval Construction and Armaments Co., of Barrow-in-Furness, do not intend to be beaten by any south-country or London firms in the production of high-speed torpedo-boat destroyers. The former firm

have taken a high place by the construction and successful trials of the *Starfish*. The requirements for the vessel were a speed of 27 knots on a trial of three hours, with 30 tons deadweight on board. As a result of six runs, the *Starfish* obtained a mean speed of 27.87 knots in a squally wind and a broken sea, and in other longer runs 28.05, making a mean speed over the three hours of 28 knots, or one knot in excess of specification. So far also the results are a triumph for water-tube boilers, which in this vessel are of the Blechynden type. The steam pressures were easily and constantly maintained, and at a very fair coal consumption per I.H.P. Had the speed been reduced to the stipulated minimum the coal consumption would have been still more economical, as the forced draught might have been reduced with probable reduction of the temperature of the escaping gases. A point of importance tested by these trials was that even at the high speed forced there was no such emission of flames from the funnels as might have notified the approach of the vessel to an enemy. If the water-tube boilers of this boat will stand the test of long service as well as they have stood the test of evaporation and economy they will go a long way to establish the reputation of water-tube boilers. Even should leakages or bursting of tubes in the course of time occur, we are assured that all or any of the tubes can be withdrawn and replaced without cutting a single rivet either in hull, decks or boiler casing, which is a great advantage for easy renewal.

OWING to the adoption by the Admiralty of the Belleville Boiler, that boiler has received much scathing criticism both from those interested in the Scotch form of cylindrical boilers, and from those interested in other water-tube boilers which they believe to be better. Time will alone produce reliable data as to the rival merits in durability of the various much-discussed types. There is, however, one peculiarity in the Belleville type proper that does not seem to have been singled out for either criticism or praise. It is that the feed water is introduced into the steam space of the boiler. This in itself is entirely contrary to the prejudices of generations of British engineers. Without a particle of confirmatory evidence, we would venture to predict that 90 out of a 100 British engineers would consider the introduction of comparatively cool feed water into direct contact with steam in the steam space of a boiler was absurd and suicidal, as in their view tending to produce immediate condensation of the essentially vital element of the boiler, the "live steam," as it is called. In our opinion this view is a fallacy. The feed water can but absorb the particular number of

units of heat that it requires to increase its temperature from that at which it enters to that of the water in the boiler. Whether this heat be abstracted from the water contained in the boiler, or from the steam, is, we state, immaterial, so long as the steam is in direct contact with the water. The action of a jet of cold water upon a volume of steam isolated from its generating water, is well known and recognised as producing prompt condensation, but where a volume of steam is imprisoned in direct contact with highly heated water of evaporation, then any local or even extended condensation of the steam is at once restored by the re-evaporation of steam from the boiling water, instantaneously caused by the slightest diminution of pressure of the superincumbent steam. There are many arguments in favour of introducing feed water always in the form of spray into the steam space of a boiler rather than under the surface of the water, and we think that the life of many boilers would be much increased by the adoption of such a plan. It is well known, although the reasons therefore may be obscure, that much pitting and corrosion go on in the plates of boilers close to the feed inlet, and it is recognised that this, in some way, is due to the impingement of a stream of cold water upon the hot plates. Leaving on one side the possible explanations of this peculiarity, it is evident that an excellent preventative would be to ensure that the feed water should enter in a minutely divided spray or stream, and that it should be heated to boiler temperature before it reaches any of the boiler plates. This result is excellently arrived at by the admission of the feed water into the steam space of a boiler in the form of spray. Of course, the part of the steam space selected for such entry should be as far away as possible from the steam exit pipe, to prevent the draught of the issuing steam from drawing the falling spray of the feed water with it, and thus producing wet steam. We are curious to know if this peculiarity in the original type of the Belleville boiler has been followed in those fitted in England, and if the results, as we anticipate, have been favourable to such arrangement of entry of the feed water.

A STEADY revival of trade throughout the United Kingdom at last appears to be an accomplished fact. The Board of Trade returns of exports and the statement of Revenue show marked increases steadily maintained since about July of the present year. The shipbuilding trade has already felt this revival, but as usual the growing feeling of confidence that more prosperous times are within sight, which is so essential for the consummation for a sound revival of trade, is already receiving rude shocks by the threatened labour troubles amongst the engineers on the Clyde

and in Belfast. We trust that a more sensible and amicable feeling will shortly prevail at Belfast, as the Clyde troubles seem nearly at an end, so that the marked tendency to an improvement in business may receive no serious checks. As an important confirmation that the world-wide depression of trade is at last reaching a termination, to be succeeded by prosperity increasing by leaps and bounds, it is gratifying to note that the export trade of the United States has in the last eight months increased by 25 to 30 per cent., very much, it is said, to the surprise and gratification of the Americans. At the same time the State revenue and trade in the Australian Colonies is all on the upward grade, so that look where one will the tendency of trade is at last towards better things. The conclusion of the war between China and Japan will now also shortly bring in fresh customers to the general market, in machinery and ships at any rate. It is reported that ten millions already banked in England will shortly be transferred to Japan, and that its destination will be for further supplies of ironclads and armaments. China also, although a great financial sufferer in consequence of the war, must also bestir herself to increase her navy armaments and probably telegraphic and railway communications, the need for which has now been so forcibly brought home to her. As the cash to be disbursed has been obligingly found for her by Russia and France, her great credit and immense internal resources will enable her still to be a good customer in the market for such products as she may require. We must, however, look carefully to our position as at present the leading manufacturing market if we are to retain our former position. It is well known that Germany and America are running us very close in all our foreign markets, and now having tasted blood in that direction, are not likely to diminish their efforts to secure a larger share of the anticipated prosperity. We are cursed here as manufacturers with too many prejudices and established habits of production, which lead our manufacturers to suppose that what has hitherto secured a market will always continue to do so, and further, our labouring population are too imbued with the idea that nobody can rival them in their especial works, and throw all sorts of serious obstacles in the way of securing contracts. The rival countries who are trying to secure new markets have no such shackling prejudices as to what the market ought to take, but adapt themselves to the wants they find expressed, and have little trouble with their employes in the carrying out of contracts.

**Thekla.**—On September 13th a steel schooner-rigged steamer of 3,800 tons gross, named the *Thekla*, was launched at Flensburg, owned by Deutsche Dampschiffe Rhiderei zu Hamburg. Port of registry, Hamburg.

### THE UNITED STATES METALLIC PACKING.

WE have received from the United States Metallic Packing Co., Limited, of Soho Works, Thornton Road, Bradford, a descriptive illustrated pamphlet of their automatic self-adjusting metallic packing for marine, locomotive, and stationary engines, pumps, &c.

In addition to an illustrated description of the two forms of packing as made by the company, the pamphlet contains a very complete list of the firms using their speciality, and from this list we select, at random, the names of the following vessels as having been fitted with the packing—H.M.S. *Terrible*, *Jupiter*, *Hermione*, and *Sultan*; and the torpedo-boat destroyer *Rocket*, *Shark*, and *Surly*, as well as the four new destroyers by J. & G. Thomson, Limited, and the seven Spanish gunboats by the same builders. We note that the new steamer, by the Fairfield Shipbuilding and Engineering Co., for Messrs. Donald Currie & Co., is also to be supplied with this packing, and that it is to be found on the White Star Co.'s *Germanic* and *Georgic*, as well as on all the leading vessels of the American Line (Southampton), the Inman, the Red Star, the Hamburg-American, and the City Line (Glasgow).

Among English railway companies we notice the London and South-Western have over 500 sets at work, the Manchester, Sheffield and Lincoln 264, and the Midland 984 sets.

Reading through a few out of hundreds of testimonials, we observed one case in which a low-pressure cylinder 52 in. diameter (piston speed 600 ft. per minute) maintained 1 lb. more vacuum after the United States Metallic Packing was fitted, this showed on the card an increase of 38 I.H.P. with the same fuel consumption.

Another user states the packing has been in constant use on a compound mill engine, running 100 hours per week, for three and a-quarter years without incurring a single penny of expense for renewal or repairs.

The packings are entirely metallic, and several instances are given of their having run nine years without renewal, while the fact that they have been applied successfully to such varied requirements as hydraulic rams, ammonia engines, steam hammers, &c., shows their general adaptability and power to withstand almost any strain however severe it may be.

### COMBINED CUTTING-OFF, ENDING-UP, AND CENTRING MACHINE.

MESSRS. DEAN, SMITH & GRACE, of the Worth Valley Tool Works, Keighley, are the manufacturers of the very useful time and labour-saving tool which we herewith illustrate.

Specially designed for expeditiously cutting off shafts (up to 4½ in. diameter, or 3 in. square), to gauge lengths from mild steel bars, this machine is also equally useful for a variety of other jobs, such as cutting off blanks for washers and check nuts, cutting off iron and steel tubes, &c.

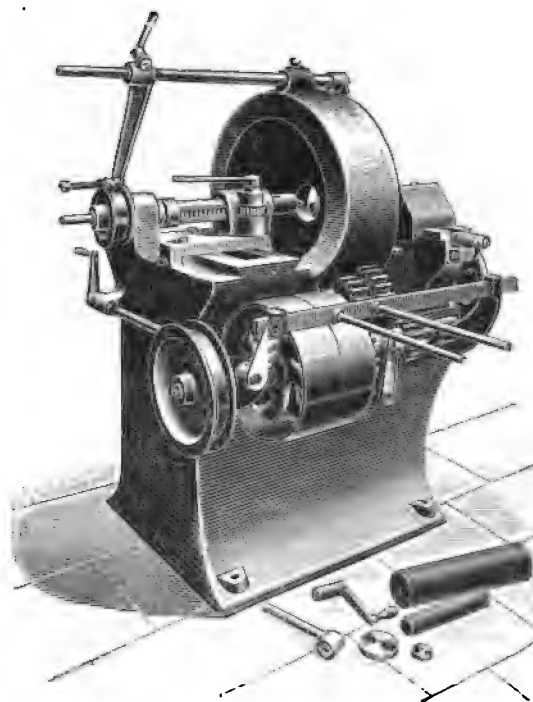
As the machine provides a rapid and accurate means for ending-up cranked or plain shafts, cutting them off to length and centring them, it should soon show a saving in the cost to makers of turned shafts and railway axles.

As a boy can work this machine, and centre and end a shaft in half the time it takes a man to do it in a lathe, it is obvious that a deal of skilled labour can be saved, as all work leaves the machine ready ended and centred for the turner to start on at once, and as showing the speed at which it works, we may state that the machine will cut a steel shaft in lengths in from one-half to one-third of the time taken by a first-class cold iron saw, a 4 in. diameter steel shaft being cut through in less than seven minutes with a 3-16 in. parting tool. As these parting tools are of the ordinary

shape they can be sharpened in a few minutes on any grindstone, thus obviating the necessity for any special sharpening machine, while, furthermore, the cost of such a tool is only about one-fortieth of that of a saw-blade.

The machine, as will be seen from the illustration, is all self-contained, and consists of a main casting of box-like section, carrying on top and about its centre a large annular bearing fitted with a revolving disc wheel, through the centre of which passes a 4½ in. hole. A transverse slide fitted with a cast-steel tool holder traverses this plate radially, being automatically fed up to or withdrawn from the centre by means of a fine screw thread and star wheel at one end.

The driving of the disc wheel, and consequent rotation of the tool round the work, is effected by the fast and loose pulleys and sets of spur gearing shown. One set of the spur gearing gives a three to one, and the



other set a six to one purchase, a lever throwing either set in or out of gear, or stopping the tool without stopping the main driving shaft as desired.

The centring headstock shown on the left of our illustration, a back view, can be moved clear of the centre hole (to allow of shafts running right through), upon the V slides and quickly returned into exact position against a stop by means of a screw and handle, the centring spindle being driven by a small band from the main shaft, and fed up by rack and pinion with a horizontal handle. At the other end of the machine a self-centring chuck, gripping from 1 in. to 8 in. diameter, is arranged, and to the side of this is fixed a screw and hand wheel for adjusting the cut when ending-up work. The large capacity of the self-centring chuck renders the machine very suitable for facing up flanges of elbows, tees, "making up" lengths of pipes with flanges to 16 in. diameter, and other similar jobs.

All handles are most conveniently placed so as to be within easy reach of the operator, and the machine is complete in every respect even to rotary pump for suds, while the workmanship and materials are throughout of the best possible character.

One large firm having had considerable experience with the machine, write the makers, saying: "We find it does considerably more work than the saw, and are using it constantly for cutting tough steel shafts from 3 in. to 4½ in. diameter, which we centre at same time. We end and centre in this machine axles up to 7 in. diameter. Up to the present we find the machine fully equal to what it was represented to be, and it has given us entire satisfaction."

### SHIP MODELS FOR EDUCATIONAL PURPOSES.

MESSERS. KELSO & Co., the well-known model-makers of Glasgow, so many of whose productions in the way of highly-finished ship models have been objects of great attraction in most of the international and other exhibitions held within recent years—as displayed at the stands of the builders of the actual ships—have just completed a unique specimen of their art deserving of some notice. This is a miniature representation to the scale of ⅓ in. per foot, or 1-32nd of the actual size of the original, of the screw steamer *Ruahine*, one of the New Zealand Shipping Co.'s fleet, built by William Denny & Bros., Dumbarton, about four years ago. Instead, however, of the plain exterior of the hull ordinarily shown by ship models, the present one consists of half the ship, represented as cut through the centre line, from stem to stern, and from keel to masthead, exhibiting, in section, all the items which go to make up the hull structure and outfit. It is constructed entirely of brass, and has been built up, piece by piece, exactly as in the case of the full-sized ship, the work having occupied twelve months, considerably more than were required for the completion of the original vessel. The number of separate pieces going towards the completed structure numbers many thousands; and while, as was only possible on such a small scale, the binding medium employed has been solder, and not rivets, as in the real vessel, each and every rivet is clearly and faithfully represented. This attention to such minutiae as rivet heads and points will convey an idea of the fidelity and exactitude with which all the other work has been produced, such as frames, reverse frames, floors, pillars, beams, bulkheads, deck plank, deck-houses, deck fittings, &c., &c. This will be further understood when it is mentioned that this fine example of the model-maker's art—measuring 14 ft., by 1 ft. 6 in. deep—is intended for educational purposes on board the training ship *Worcester* (of the Thames Nautical Training College), lying off Greenhithe, where, under an able commander, Captain D. Wilson Barker, schoolmaster, and subordinate officers, cadets are trained for the merchant service. Not only is the hull of the vessel rendered with painstaking exactitude as concerns its interior economy—e.g., holds, ballast tanks, 'tween decks, deck-houses—but the machinery, both propulsive and auxiliary, is reproduced to scale; the boilers, the screw shafting, the thrust and tunnel bearing blocks, the propeller, &c., being specially well counterfeited. Doors in the water-tight bulkheads are made to open and close from deck by means of gear as actually fitted, and pumps and piping for draining the several ballast and hold compartments, are all closely reproduced.

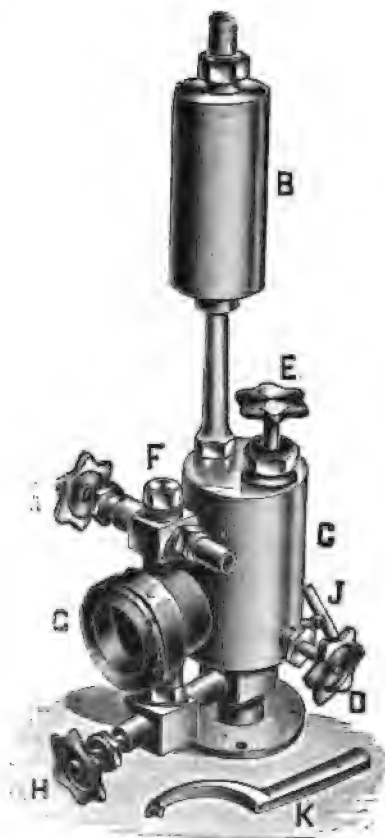
That side of the model which represents the hull exterior shows faithfully the "strakes" and the "butts" of shell-plating, and the hull itself is shown resting on the "cradle" and "ways" ready for launching.

As an index and guide to the materials employed in the art of modern shipbuilding, and the place and form they take in the completed structure and as affording an idea of the arrangements essential to the safe navigation and management of a first-class modern merchant ship, the *Ruahine* in miniature should prove most valuable on board the *Worcester*, or indeed on any of the obsolete hulks which now do duty as naval "training" ships.

### BALDWIN'S PATENT "PERFECT" SIGHT-FEED LUBRICATOR.

IN the lubricator herewith illustrated, the "sight-tube" and its liability to breakage are both done away with, the former being replaced by a stout glass disc deeply recessed in the manner shown at G, thus effectually removing it from the chance of all but wilful breakage.

As this lubricator uses every drop of the oil a considerable saving is effected, while all the passages are arranged to admit of a clean "blow-through," thus ensuring perfect flushing whenever required. The lubricator is easily and quickly filled, so saving trouble and time, and as all the parts are made in



duplicate, to standard gauges, any repairs necessary may be simply and cheaply carried out.

To set up the lubricator the condenser B is connected to the steam pipe, the pipe carrying the oil to steam chest, or steam pipe, being coupled to the union at the end of the valve I. Having closed all valves the plug E is removed, the chamber C filled with oil, and the plug replaced. The cavity behind the sight-glass G is then filled, through the plug F with warm water. This plug having also been replaced, the valve D communicating with condenser, and the valve I controlling pipe to steam chest, are opened, and the feed regulated to the amount required by the valve H.

To refill is a simpler matter, as it is only necessary to close the valves D and H, open the tap J to discharge the water from the oil chamber, removing the

plug E to admit the necessary air, and when the chamber is empty close tap J and fill chamber with oil. Replacing plug E, opening valve D and regulating supply with H, completing the cycle.

The maker also supplies a modified form of sight-feed lubricator for use in conjunction with an oil pump, the condenser, oil chamber, filling plug, &c., being dispensed with.

These lubricators are made of best gun-metal, and finished throughout in the very best manner, they are made in sizes ranging from half-a-pint to half-a-gallon, and in price compare favourably with any standard make, the oil-pump, sight-feed lubricator at 30s. being one of the cheapest we have seen.

### FORCED DRAUGHT AND INDUCED DRAUGHT.

**A**S much interest is at present centred on the merits of forced as against induced draught on high speed steamers the following particulars may be useful:—

In forced draught, the stokeholds or boiler-rooms are capable of being closed to the atmosphere by suitable doors, and air for the furnaces of the boilers is then obtained by means of centrifugal fans revolving at high speeds. These fans draw, or pump, air from the upper portion of the ship, or the atmosphere, and deliver the air into the stokeholds. Until this air can escape there will naturally be a greater pressure of air in the closed stokeholds than in the ordinary atmosphere on deck, and the extent of the air pressure is measured by water gauges placed in the stokehold, the action of the gauges being similar to the action of an ordinary atmosphere barometer. The only means by which the air can escape from the stokeholds when closed, is through the fire grates or furnaces of the boilers, and in passing through these grates at a pressure greater than ordinary atmospheric pressure, a greater quantity of air is supplied to the furnace in a given time, and hence the combustion of the coal, the production of heat and the generation of steam become more rapid.

With induced draught the stokeholds are kept open to the atmosphere, but the position of the centrifugal fan is different. It is placed in the base of the funnel—and in revolving causes a partial vacuum at this part of the boiler, the action of the fan being to expel the heated gases from the fires upward through the funnel with the air, and by so doing to induce a quicker passage of air from the stokeholds through the furnace grates into the funnel and atmosphere. In both cases more rapid production of heat from the fires, and therefore a quicker generation of steam, is attempted; the main idea of each system being to pass larger volumes of air through the fires in the furnace than would be the case when the vessel was relying upon natural draught only.

Forced draught therefore means fitting up an air pressure in the stokeholds; induced draught means creating a partial vacuum in the base of the funnel. In the former case the air is pushed through the furnaces, in the latter it is pulled.

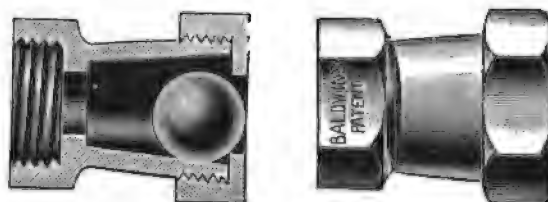
### PATENT SAFETY AUTOMATIC WATER GAUGE.

**W**E have pleasure in herewith illustrating Baldwin's Patent Perfect Safety Automatic Water Gauges as manufactured by the patentee, Mr. James Baldwin, of the Devonshire Brass Works, Keighley.

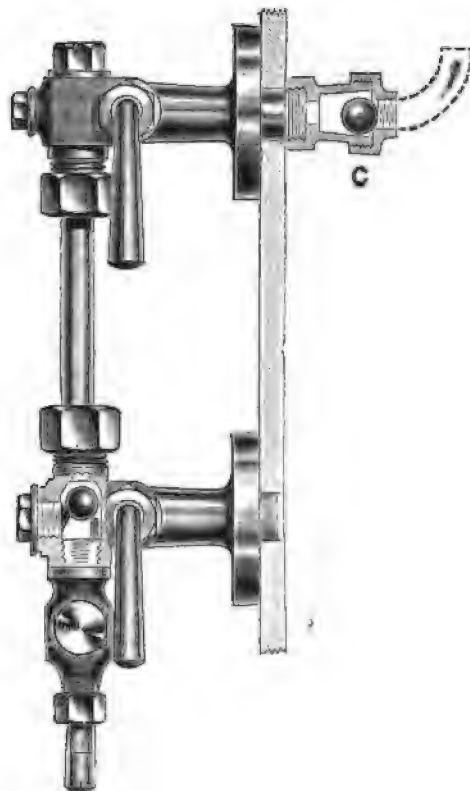
As will be seen from the illustration of the complete gauge, one of the patent automatic stoppers, shown enlarged in section and elevation, is fixed inside the boiler to the upper, or steam inlet of the gauge which it closes at once on the breakage of the glass, while the ball valve, shown in the lower fitting, controls the flow of water to the glass and at once stops

any outrush should the glass be broken. The upper and lower outlets being thus closed simultaneously.

These gauges are well and strongly made of best metal and asbestos packed, and are well spoken of by users.



The Patent Automatic Stoppers may be had separately to suit any existing water gauge, either screwed or flanged ends, and affords a ready and cheap means of converting an ordinary into an automatic safety gauge, and in these extra high pressure times all gauges should be provided with an efficient automatic safety device.



A further invention of Mr. Baldwin's, namely, his patent "Perfect" Stop and Feed Valves, adequately supply a long-felt want. These are the only form of valve, with which we are acquainted, that allows of both the valve and its seat being taken out, examined, cleaned, repaired, or renewed, and replaced while under steam pressure. This valve is made in all sizes, from  $\frac{1}{4}$  in. upwards, and as extra seats and valves are supplied it should practically prove everlasting in wear.

A water gauge provided with these interchangeable valves and seats appears in Mr. Baldwin's list, and from



it we learn that the similarly fitted bottom tap, threaded to suit any water gauge, may be had separately.

## THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

### Liverpool Improvements.

AT the end of September I had an opportunity of seeing thoroughly the working of the new arrangements whose inauguration and working on a special occasion I had viewed previously.

Accordingly I went down to Liverpool by the Cunard special at noon one Saturday when the rush of Americans to the westward was at its height. A tremendous train it was. Two dining-saloons, wherein the passengers could have a very ample luncheon, five ordinary saloons (including one especially reserved for the party of Sir Augustus Harris, of Drury Lane fame, who was off on a flying visit to New York), six composite coaches, and four vans. The whole was drawn by two engines, one being a compound of Mr. Webb's favourite type, and the other an ordinary express locomotive, with two pairs of driving wheels coupled. The train was timed to reach the new Riverside station at 4.15, and it did so with something to spare, the fact being that the North-Western do not press themselves in the least, and could easily improve this service if necessity or convenience urged them to do so.

An army of stewards were stationed on the platform, and the passengers were speedily relieved of their hand luggage to find it stowed away in their staterooms when they reached them a few minutes later. It was but a few steps on to the big ship, and whilst the heavy luggage was being put on board the steamer one had time to look at the stage.

Saturday afternoon and the biggest and fastest ship afloat just alongside had proved an attraction to many Liverpool people, who under every circumstance are wont to make the landing stage a promenade—and the sea of faces turned up to the big ship was a sight not easily forgotten, especially when the last gangway was removed and the crowd broke into the reserved space and filled up the huge area. Nowhere else would it have been possible to witness so great a gathering under such circumstances. About twenty-five minutes sufficed to get the passengers and their baggage into the ship, and we slipped away at once down the river, the tender *Skirmisher* giving her assistance at the start. Little need be said to-day about the big Cunarders themselves, they have been so fully described here and elsewhere; but it is certainly noticeable how well the engines run, and as far as these ships are concerned the old story as to the engineers of Atlantic greyhounds working in oilskins is a fable. There was not a drop of water about the bearings, and certainly no need for any. I noticed that Mr. Miller, the chief engineer, keeps his main shafts almost as bright as his connecting rods. He believes that by doing so he makes the discovery of incipient flaws more easy. At daylight we were off Roche's Point, and on entering the harbour were boarded by the Irish contingent of passengers, whose advent made the vessel so absolutely full that expectant passengers of all classes were doomed to disappointment. The work of embarking passengers and their baggage here was somewhat leisurely accomplished, for there was plenty of time to do the work, it being known that the mail train with the letters from London up to the close of business on Saturday was not only not due, but was even somewhat late, owing to the prevalence of fog off Dublin. As soon as the mail tender came alongside, however, business commenced in earnest. A large number of men began the job of putting the bags on board what time the anchor was heaved, and the big ship started on her voyage with so easy a motion that one had to look at the land slipping by to see that she was actually going. By the time the last bag was embarked we were off Roche's Point, and as the tender finally cast off the *Lucania* had not too much space before she reached Daunt's Rock to give her a fair flying start for the time of her passage in the great ocean race to New York. How expeditiously the mail transfer is conducted under the superintendence of Mr. Dean, the able Queenstown agent of the premier Atlantic company, will be gathered from the simple fact that that evening, when we went out to pick up the *Gallia* on her inward run, the tender was only

alongside twelve minutes, in which space the mails and the Irish contingent, comprising seventy passengers and their baggage, were disembarked on to the *America*.

One little circumstance made a great impression upon me, though it has doubtless passed under the eyes of many others interested in shipping. It is a wall in Queenstown with the name of a certain firm who have been appointed agents for certain steamship lines. The names of the lines are given: they comprise those of three companies deeply bound up with the history of the mail and passenger trade between Liverpool and New York. A fourth is that of a line hailing from a more northern port. The fifth is not an English line at all. Of these three are dead altogether. The fourth is, I fear, moribund, and the last, though greatly flourishing and extending, has now little to do with the Irish port. Is not this a little commentary on the vicissitudes and dangers of shipping property?

Passing up channel in the comfortable old *Gallia* with a genial and capable skipper in Captain Hewitson, I found it possible to spend a couple of hours in Liverpool, and put in the time by paying a visit to the new Cunard works. But my reference to this must be reserved for another occasion.

Speaking of the *Gallia* reminds me of an amusing cutting from a Boston paper which Captain Hewitson showed me. It appears that the vessel had had a rough westward voyage. Rough might apply apparently both to the temper of some of those on board and to the weather. The captain deemed it expedient to make a run to the south and took his ship into Boston without damage. The Boston papers, however, rushed into head-lines over the business, talked about the near escape the vessel had of rolling over, and generally showed the old-world journalist how to make a mountain out of a molehill.

### Holyhead Mails.

The Dublin Chamber of Commerce has done very wisely in its recent action in this matter. The new service is not to commence till March, 1897. A good many mercantile bodies would have left things severely alone till then. Meanwhile the Post Office, in conjunction with the railway and steamship companies concerned, would have gone into the matter and made out their programmes. Then if that did not suit the general idea there would be an outcry and an attempt to get things altered when it was probably too late to do anything. Now the Chamber has appointed a committee, which has already rendered a report showing how the economy in time which is to be effected can be made most useful in giving a longer "postal day" for replies to correspondence in the more distant parts of Ireland, it has made its suggestions and found its fault with the scheme. It has thus made its position very strong and at the same time made it difficult for its recommendations, which are not by any means extravagant, to be overlooked.

From this report we learn something of the dimensions of the four new boats whose keels are now being laid in Messrs. Laird's Birkenhead yard. They are to be 5 ft. longer, 2 ft. broader and 1 ft. 9 in. deeper than the *Ireland*. That will mean that they will be 28 ft. longer and of 5 ft. more beam than their four predecessors of 1860 which now do the major part of the work of carrying the Irish Mails. Though the *Ireland* increased in length and beam as compared with the others she maintained the same depth. Apparently the works which have been in progress will now allow of a considerable increase of draught.

I give the dimensions and tonnages of the old boats and the probable dimensions of the new:—

Name.	Built.	Tonnage.		Dimensions.				How Propelled.
		nett.	gross.	ft.	ft.	in.	ft.	
<i>Leinster</i> and three sisters	1860	566	1,716	346	0	35	0	19 0 paddle
<i>Ireland</i> ..	1885	671	2,095	366	3	38	3	19 2 ..
New twin-screw Steamers	1896	..	..	371	0	40	0	21 0 twin-screws.

### Publications.

I have received a copy of Messrs. C. W. Kellock & Co.'s recent catalogue of the vessels they have on sale. It is a tremendous list, and it would appear impossible for anyone to have requirements which cannot be satisfied by what is contained therein. Mail steamers of large size and modern construction, cargo boats of every size and age, sailing ships suitable for various trades, channel and coasting steamers, tugs and yachts, all are

here. Even a show-boat is included in the list. The advantage or disadvantage, as the case may be, in a shipbroker's business seems to be that it is folly to go to any but the big men. The little ones have no chance. Therein lies the difference between this business and that of, say, a stockbroker. The latter goes into the market and he buys stock at a certain price, the customer does not mind what stock. The numbers of the bonds are nothing to him, and one block of consols of the same size is as good as another at the same price. So one stockbroker is practically as good as another. With a shipbroker it is quite otherwise. No two ships are alike, and the man who has on his books the largest assortment is the one to whom customers naturally turn. Thus it is that Messrs. Kellock's stocks do not long remain on their hands, and changes in the catalogue are frequent. The catalogues quickly therefore get out of date. To anyone who desires to appreciate the true position of the shipping industry a careful perusal of this publication will be at once most interesting and most instructive.

#### The "Oroya,"

I am pleased to see, has left Belfast for London having completed the repairs rendered necessary by her recent sojourn on the hard at Naples, and she is listed to resume her sailings for the Orient Line, leaving London for the South Australian ports on the 1st November.

#### The West India Royal Mail Line

seems to have done well lately, and has just paid a very satisfactory dividend, whilst it is now ordering three more steamers. Particulars as to these have not yet transpired.

#### A Big American Sailing Ship.

An esteemed correspondent asks me particulars of the American sailing ship *May Flint*. She is a vessel with a history. She was built in 1880 for the Royal Exchange Shipping Co., the line which will go down to history as having transported the big elephant Jumbo to America, though its name no longer exists in the lists of the fleets. The *Persian Monarch* did duty for the country as a transport in the Egyptian war, and on the winding up of the line for which she was built passed into the hands of the Wilson-Hill Line. For them she ran between London and New York till last year, when she stranded on the American coast and was considered to be a total loss. With great skill and pains the American wreckers got her off and carried her into the port of New York. There she was sold to satisfy the claims of her salvors, and being refitted came on to the American Register as the sailing ship *May Flint*. She left Baltimore on her maiden trip to the West coast of America in April, and was very much overdue, though she eventually turned up at San Francisco with a very large consignment of Pennsylvania coal.

#### The Mutual Idea for Steamers.

Some little time ago I noticed the prospectus of a new steamship company which offered its shareholders the advantage of deadhead tickets by their boats. I pointed out that the idea was not likely to be a successful one, as the deadheads would not care to travel in the off season, and would be apt to shut out paying passengers. My prophecy of failure has been abundantly fulfilled, but the concern never got as far as showing whether the shareholders would be content to travel in the off season, for, as one of the officials stated in his explanation of the ill success of the concern, "there were so many breakdowns that even the shareholders did not care to use the line." It is not worth while to point out the other mistakes which were made, nor is it fair to hit people when they are down, so I pass over the rest in silence.

#### British and Foreign Mail Steamers

Two little paragraphs, which, taken together, have a certain interest, appeared in the papers in reference to the competing outward trips of the *Campania* and the *S. Louis* at the end of September. The papers of Saturday, the 21st September, contained a report made by the captain of the *Campania* to the effect that he had in the course of his passage sighted the *S. Louis* twenty miles ahead, and had in seven hours passed her. This is almost identically what I said must have been the case when the *Paris* was alleged to have had a "race" with the *Lucania*. The *S. Louis* is about the speed of the *Paris*, and she was overhauled at the rate of nearly three knots. Her whole passage was under six days twenty-two hours, which is within

five hours of her best performance. The *Campania* crossing at the same time was five days eleven hours thirty-four minutes, which is some hours over her best. Thus the weather could not have been very favourable. One is therefore a little surprised to read in the *Shipping Gazette* of the 23rd that the *S. Louis* had reached New York "with one engine disabled; damage slight." The damage cannot have been very serious for it did not prevent the vessel leaving in her regular turn on the 25th. I should much like to know what the damage was, and whether it occurred before the *Lucania* overhauled her. If it did the suggestion that the *S. Louis* with one engine ran something like nineteen knots, or very nearly her maximum speed at sea, is the greatest proof of the efficiency of the twin-screw yet given to the world.

A curious instance of the practice of the American Post Office was given in the case of the eastward mail of the 18th September. The *Majestic* and the *Paris* were the vessels of the day. The mails, or the bulk of them, were given to the *Paris*. This was quite right if it was done because the *Paris* was an American ship. It was quite wrong if it was done on the plea that she was the most expeditious. The *Paris* started on her run at 12.38 p.m., the *Majestic* not till 5.30 p.m. The latter reached Queenstown at 3.15 a.m. on the 25th, and her mails were distributed by a late post on Wednesday night in London. The *Paris* did not reach Hurst Castle till 7.30 a.m. on the 26th, having occupied one day and a half longer in her trip to Southampton than the *Majestic* did in her run to Queenstown. She thus lost nearly a day on the trip to the White Star liner. It is evident from recent performance that even the faithful work of Messrs. Thomson cannot stand the terrible strain of the three-weekly round, and that the *Paris* and *New York* (especially the former) are deteriorating.

Indeed, after an outward trip, in which her time rose to eight days and several hours, the *Paris* had to be withdrawn and sent to Philadelphia for an overhaul. Her eastward sailing was taken by the *S. Paul*, which had just completed a very satisfactory trial, which entitled her to the benefits of the American subsidy, and we may therefore presume that this vessel will not be tried in the English Channel. The *S. Paul* is practically an exact reproduction of her elder sister, the *S. Louis*, but she has had larger funnels fitted, in view of the experience of the former ship. She made her maiden trip in seven days fourteen hours. She is said to have experienced unfavourable weather, and her performance is, in fact, some ten hours worse than the first run of the *S. Louis*. The value of a maiden trip as a criterion of eventual speed is absolutely nil. It may, however, be noted that her best day's run was 440 nautical miles, showing an average speed for the day of 18½ knots.

The *S. Paul* is under the command of Captain J C. Jamieson, who, as my readers will remember, brought the *New York*, as the first American liner, to Southampton. Captain Grant succeeds to the command of the older ship. There was a civic reception to the *S. Paul* by the Mayor and Corporation of Southampton, and the officers and crew were regaled at a mayoral banquet the day after the arrival. I have seen many accounts of this function, and the names of various officials on board the new ship are recorded. Even the chief steward and the purser are handed down to fame. One of the two principal persons on board such a vessel—if not the very chief man—is the chief engineer, but he escapes any recognition. This may perhaps be because he, doubtless, found too much to attend to during his brief stay in port to be able to spare any time for social intercourse. But he should not have been so completely ignored. The *S. Paul* was not much over 48 hours in port and there must have been a great deal to be done in the time, especially as she had to ship some heavy weights under the cranes of the new graving dock.

#### Old Liners.

The announcement is made that on November 14th, unless previously disposed of, the famous greyhounds *Alaska* and *Arizona* will be offered for sale by auction by Messrs. Kellock & Co., of Liverpool. The speed of the two ships is put at 16½ and 15 knots respectively "on the Atlantic, when loaded." They are described as being "in excellent condition and ready for immediate service." As is known to most of my readers, they have for a good while been lying in the Gareloch, and would no doubt be an excellent investment to any persons who might be in want of such craft. The difficulty is that the number of such persons must be very limited, as vessels of their size, power, and speed are not by any means adapted for ever-

and those who are engaged in suitable trades may not be in the market at the moment. In the fourteen years of her active life the *Alaska* made just about 100 double voyages across the Atlantic, and so has run somewhere about 600,000 miles. The elder vessel has made about three dozen more round trips.

#### The P. & O. Co.

have reverted to their old love, and their familiar flag is once more to be seen in Venetian waters. The Italian Government has arranged for the British company to carry on a service between Venice and Port Said. The first sailing was made on October 24th by the *Thames*, and both her departure on that day and her arrival some ten days previously were made the occasion of great demonstrations both by the population of Venice itself and the British residents there.

#### Mail Subsidies.

In many matters we must all sympathise with Mr. Henniker Heaton, and with the work that he has done and is doing in improving our postal service, both by suggestion and by criticism. He has lately made one of the Sunday papers the vehicle for his expressions, and on a recent Sunday he therein made some very pertinent remarks, and showed up some very bad holes in the harness of the Post Office. Yet there was one point—and that a very important one—in which I think few persons who take any interest in the questions connected with our Mercantile Marine and the defence of the Empire will be disposed to agree with him. He considers that the rate paid by the Post Office for the conveyance of mail matter, when considered in the light of the rate paid per ton of postal matter carried, is excessive and ought to be decreased. He says we pay some £200,000 per annum, and considers less than one-twentieth of that amount would be sufficient to repay the shipowner for what he does. He argues that the other nineteen-twentieths of the postal expenditure in the carriage of mails by sea, though it comes out of postal revenue, is really a payment to subsidise shipping, and to maintain a reserve of armed cruisers for the defence of the Empire, and he concludes by stating that in his opinion a payment of two pounds a ton would be ample remuneration for the shipowner for the carriage of the country's letters. On this hypothesis he builds up a scheme whereby Imperial Penny Postage would be practicable and even lucrative. Now I believe that Imperial Penny Postage would be a great advantage to the Empire as a whole, binding the various colonies to the mother country, and to one another, but I certainly believe that it would never do to attempt to secure it by beating down the receipts of the Mail Lines in any such way as is here suggested. I venture to think that Mr. Henniker Heaton has misapprehended the whole economical situation of mails as it affects the relation to shipowners. And for this reason. He does not realize that the fluctuations of trade according to the seasons of the year affect the demand on the shipowner's facilities for everything save mails. There is a rush of cargo in one direction at one time of year, and a tide setting the other way at another. There are times when the demands upon his passenger accommodation are beyond his powers of satisfaction, there is an off season when he has no passengers at all. For instance, I saw a recent case where there were two hundred and forty-five saloon passengers in a certain ship on her outward trip and only ten the other way when she returned ten days later. Ten passengers would hardly have made it worth this ship's while to fulfil her declared voyage. It would have been cheaper to return their passage money. But there were the inexorable bonds of postal contract to tie her to her intention. She had her mails to carry and she must go. The mails are always on hand, always flowing in each direction, and they demand great and regular speed, which is not demanded by any other cargo save the human cargo, and that as I have said lacks the regularity in flow which characterises the mail traffic. Thus it is that the mail matter must not only take advantage of the best service offering, but must actually secure it. Thus it is no question of rate of freight for deadweight carried, it is the question of giving the shipowner sufficient inducement to sail otherwise empty ships, or at least ships that are not full of freight-paying cargo at the speed at which the mails demand to be carried.

#### Thames Steamboats.

The history of the various companies which have run the

Thames penny steamboats is roughly known to probably most of my readers. No success has attended them, and they have at length had to pass on the duty of running the vessels to a new concern. It would appear that the season when the river is an overpowering attraction to the wayfarer is too short to make his carriage a commercial success, especially as rail, bus, and tram are all in opposition with the steamer. The recent withdrawal of the steamers for the winter has caused an attempt on the part of a certain section of the community to induce the London County Council to take up the work and to make a point of running these steamers all the year round, so that the steamboat employes may have constant employment. Now, to my mind, it is very doubtful whether the municipality has any right to engage in commercial pursuits at all, and so run the chance of engaging ratepayers in a losing speculation. The reason private persons do not run their vessels in the winter months on the Thames is because they do not find it a profitable undertaking. For the County Council to do so would be for them to undertake a losing business to find employment for a certain class of men. Though these are most deserving, it seems hardly right to tax the ratepayers to give them work. This scheme is, however, superseded by another, which gives incidentally a very fair indication of the ability of this country to turn out little boats in large quantities and at great speed. It has been suggested that the London Tramways should undertake the work, and, like the ugly duckling, take to the water. The proposal involves the building of no less than thirty-two steamers of the twin-screw type, each capable of carrying some 500 passengers. The service proposed would be at intervals of eight minutes throughout the day, and this might involve the enlargement of the piers so as to enable two vessels to lie at them at the same time. The route would extend from Putney to Woolwich, and this journey would be accomplished in two hours at a cost of a sixpenny fare. The idea has not been mooted many days, and already letters have been addressed to four very leading firms asking them for tenders. The concerns invited to tender included the Fairfield Shipbuilding Co., Messrs. Denny, of Dumbarton; Messrs. J. & G. Thomson, of Clydebank; and Messrs. Thornycroft, of Chiswick. Already Messrs. Thornycroft have replied that if they have an order before the last day of November, they will undertake to build eight of the ships and to deliver them in time for the service to commence next June. The rapid delivery of the boats is, of course, a very essential part of the scheme, as it is necessary to open the service in the summer so as to get it thoroughly known and appreciated before the bad weather comes on. It will, however, not be known till November 12th, when a special meeting of the shareholders will be held for the purpose, whether the scheme will be really adopted by the 'Tramways Co

#### The New American Mail Contract,

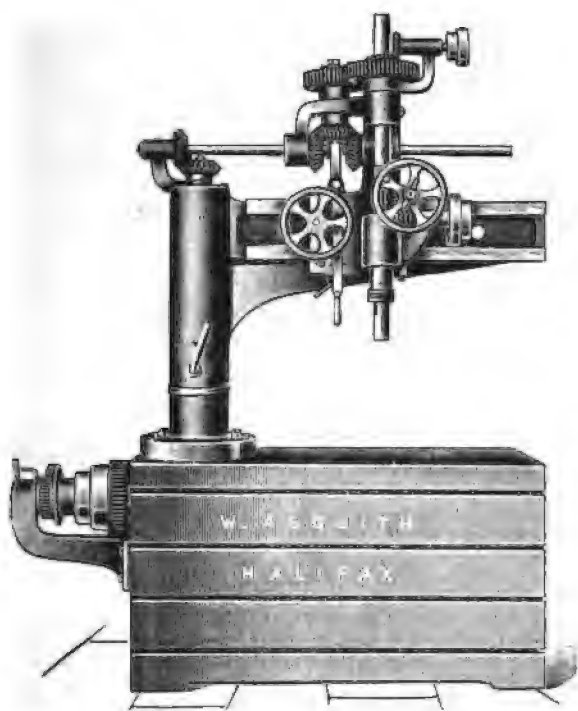
by which the owners of the American Line were induced to put the *Paris* and the *New York* under the Stars and Stripes and to build the *S. Louis* and *S. Paul*, was to be for ten years' carriage of the mail by vessels capable of steaming 20 knots, and the consideration to be paid by the Federal Government was to be four dollars a mile. This contract commenced on October 12th, 1895, and at that date the company were well prepared to fulfil their undertaking, having the four twin-screw steamers ready and the *Berlin* as a reserve boat. On October 17th the first sailing under the contract was made, the *S. Louis* leaving New York at 1.30 that afternoon. The *Majestic* of the White Star Line left three hours later, and American newspapers to hand show how hopeful those interested were that the *S. Louis* would justify their pride and confidence in the new American product by handing in her mails to the London General Post Office before her rival. The *Majestic* was at Queenstown by seven o'clock on the Tuesday morning, the 22nd inst. Just five hours earlier, when 800 miles short of her journey's end, the *S. Louis* met with an unfortunate accident, which put an end to any talk of competition on this voyage between the two vessels. She was struck by a heavy sea and had her rudder disabled. She continued her voyage, steering with her screws, and eventually reached Southampton on the Thursday afternoon. She will have, of course, to fall temporarily out of the service. This will not be interrupted, however, as the reserve ship *Berlin* was at Southampton and took her outward turn. One cannot help sympathising with our American friends over this unfortunate disaster on the inaugural voyage to which so much thought and energy had been directed.

## ASQUITH'S ADVANCED RADIAL DRILLING MACHINE.

WE are indebted to the courtesy of the manufacturer for the accompanying illustration of a small radial drilling machine, as supplied by him to several of the leading engineering establishments, and to H.M.'s dockyards.

Having special facilities for manufacturing in large numbers, this drill is claimed to be supplied at a price hitherto impossible for a really high-class tool, while the fact that five first prize medals have been awarded to the maker for his machine tools should be a sufficient guarantee of its quality.

Referring to the illustration it will be seen that all motions are immediately under the command of the workman, so effecting a saving of time and cost in the work done, as compared with the ordinary machines.



The arm, with a radius of 3 ft. 6 in., will swing a complete circle, is absolutely rigid, yet easily and quickly manipulated, and firmly secured in any desired position by the locking lever, while the spindle slide can be quickly and accurately adjusted along the arm, from front of machine, by the hand wheel, rack and pinion shown.

The spindle, 2 in. diameter, is carried in large bearing supporting it all the depth of the feed, being balanced is quickly adjustable, by rack and pinion, to any desired position, and has variable self-acting and hand feed motion of 9 in.

The pressure, when drilling, is taken by hard steel balls revolving between hardened steel faces, thus reducing the friction to a minimum and also considerably reducing the expenditure of power. The spindle can be instantly stopped, started, or reversed without

having to use the strap motion, or necessitating the workman leaving the job in hand, thus rendering the machine peculiarly applicable for use in tapping, inserting studs, &c. The spindle hole is bored to Morse's standard taper for twist drills.

The spur gearing and worm wheels are machine cut out of the solid, and the cone, turned inside and out for running at high speeds, and properly graded to drill from  $\frac{1}{4}$  in. up to 2 in. out of the solid.

The following figures will give an idea of the capabilities of this most useful little machine, the total weight of which is about 31 cwt.

The maximum radius is 3 ft. 6 in., the minimum being 1 ft. 3 in. Work up to 1 ft. 7 in. deep will pass under spindle, or up to 2 ft. in height will pass under the arm. The whole is mounted and firmly bolted upon a strong planed box bed plate, 4 ft. long by 2 ft. wide by 2 ft. 6 in. deep, having T slots on top and front sides planed out of the solid. The overhead driving motion consists of countershaft, two hangers and oil cups, two pulleys, and cone.

The maker, Mr. W. Asquith, of High Road Well Works, Halifax, will furnish any further particulars that may be desired.

## TWIN-SCREW TORPEDO BOAT "FORBAN."

WE have received from M. Normand, of Havre, the particulars of the trial trip of the *Forban* as follows:—The principal dimensions are—Length, between perpendiculars, 44 metres (144 ft. 4 in.); maximum breadth at flotation, 4.42 m. (14 ft. 6 in.); beam, 4.64 m. (15 ft. 3 in.); depth in centre, 3.04 m. (10 ft.); displacement during trials, about 125 tons; displacement with full load, about 186 tons. Armament:—Two 37 millimetres quick-firing guns; two torpedo-launching tubes 0.35 m. in diameter.

The motive power is supplied by two triple-expansion engines, each fed with steam by a Normand boiler. The machinery embodies the latest improvements patented by Messrs. A. Normand & Co., viz., feed-heaters, automatic purifiers, feed-water filters, bent and chucked condenser-tubes.

Steam trials.—17th September, 1895. (1.) Trial as to consumption of fuel at 14 knots. Duration, eight hours:—Consumption per hour, reduced to 14 knots = 192 kilos (3 cwt. 87 lbs.).

26th September, 1895. (2.) Trial at full speed. Total weight carried—including torpedo-launching tubes, torpedoes, artillery, coal, crew and effects, provisions, drinking water, and electric-light installation—16,000 kilos (15½ tons). The trial consisted of three runs along the official measured track at Cherbourg, one hour's run on an open course, after which again three runs along the measured track.

The speed during the hour's run on an open course was deducted from the average number of revolutions during this trial, and the average rate of progress resulting from the two series of runs along the measured track. For each of the two series of runs along the measured track the rate of progress made in the middle run (i.e., the second of the three), was put down at twice its value in calculating the average rate of progress.

The average speed for the hour's run with a free course was thus found to be 31.029 knots. The consumption of coal per hour amounted to 2,695 kilos (53 cwt. 5 lbs.).

MR. ARCHIBALD DENNY, M.I.N.A., of Dumbarton, has accepted the presidency of the Institution of Junior Engineers, in succession to Mr. Alexander Siemens, M.I.C.E., and will deliver his presidential address on Friday evening, November 1st, at the Westminster Palace Hotel, Professor A. B. W. Kennedy, LL.D., past-president, in the chair.

## AN IMPROVED OIL-CAN SPOUT.

**M**ESSRS. JOSEPH KAYE & SONS, LIMITED, the Patent Lock Works, Hunslet, Leeds, are now fitting all their oil cans (without extra charge) with the greatly improved and patented construction of spout shown in the accompanying illustration.

With a single fold of metal, and frequently not too perfect soldering, the old form of spout was initially



and undoubtedly imperfect in construction, a very slight kink or bend sufficing to rupture the soldered seam and so start a leak.

Leaky spouts, in so far as Kaye's oil cans are concerned, are now things of the past, for the makers construct them, as will be seen, from a single piece of metal doubly wrapped its entire length. After wrapping, and dipping in molten metal, this becomes



for all practical purposes perfectly seamless, and may be bent into almost any conceivable form without fear of leakage or breakage. (Might not our steam pipe makers take a hint from this, remembering, of course, the patentee's rights?)

We also illustrate a serviceable form of seamless steel oil can arranged for interchangeable spouts, and fitted with Kaye's patent feed hole. In this can the makers are now fitting, in common with all their valve oil cans, an improved form of sieve.

The firm's London address is 93, High Holborn, W.C., and judging from the price list with which they have favoured us we should say their goods are sold at very reasonable prices, while the quality appears to be quite equal to anything of the kind.

The same firm's patent locks are now in use on the steamers of several lines.

## INSTITUTE OF MARINE ENGINEERS.

**T**HE fifth annual dinner of the Bristol Channel Centre of the Institute of Marine Engineers, held at the Royal Hotel, Cardiff, on Saturday, October 19th, was specially noteworthy in at least two respects. The principal guest of the Centre was Mr. A. J. Durston, C.B., R.N., head of the Engineer Department of her Majesty's Navy, who is also President of the Institute of Marine Engineers (incorporated). The other noteworthy feature was the presentation of the Denny Gold Medal to Mr. T. W. Wailes (manager of the Mount Stuart Dry Dock Co., of Cardiff), to whom it had been awarded for a paper on "Raising Wrecks and Sunken Vessels." This is the first time the medal has been

presented to a member of the Institute in Britain. Saturday's function was attended by about one hundred and fifty members and their friends, over whom presided Professor A. C. Elliott, D.Sc., head of the engineering department of the University College of South Wales and Monmouthshire, and the popular president of the Bristol Channel Centre. Seated by him at the cross-table were Mr. Durston, Rev. Canon Thompson, D.D., Mr. D. A. Thomas, M.P., Mr. J. M. Maclean, M.P., Mr. James Adamson (honorary secretary of the Institute of Marine Engineers), Mr. J. Macfarlane Gray, Dr. T. G. Macormack, Newport; Councillor W. J. Trounce, J.P. (ex-mayor), Councillor J. Ramsdale, J.P., Professor A. W. Hughes, M.B., F.R.C.S., Professor Galloway, Professor Richards, Captain Pomeroy, Mr. Edmund Handcock, jun., Mr. Ivor James, M. Paul Barbier, Mr. J. A. Jenkins, B.A., Mr. T. H. Sloggett, Mr. W. Sheers, and Mr. G. Padfield. There were also present:—Mr. J. C. S. Pease, Mr. D. W. Stephen, Mr. Jov. Williams, Messrs. Ashton & Pollock (Lloyd's), Mr. Widdas, Mr. C. H. Priestley, Mr. C. Massey, Mr. T. J. Williams, Mr. John Spence, Mr. W. Black, Mr. M. Gee, Mr. P. Hacquoil, Mr. Charles Radcliffe, R.N.R., Mr. T. A. Reed, Mr. J. Chellaw, Mr. S. W. Allen, Captain Hansen, Mr. R. Noton (Lloyd's surveyor), Mr. J. Shotton, and Messrs. H. Blacker, H. Symonds, A. J. Marquand, H. J. Cooke, J. C. Raven, W. D. Rosser, J. Holland, J. C. Flynn, J. Chubb, J. Richards, Jos. Seddon, E. John, J. Grant, Rev.—Reynolds, W. Scott, W. Henry, J. Organ, C. Jones, H. Box, J. Weaver, B. John, M. Fraser, J. Fishbourne, George Wilson, M.Sc., W. Reid, A. Leveson, W. Evans, O. E. Smith, W. H. Tucker, A. R. Watson, T. Symons, Geo. W. Penn, J. Campbell, T. M. Hale, H. S. Hiley, E. J. Barrett, W. Graham, T. James, J. Boddy, L. G. Laurie, Edgar, A. S. Jackson, A. Kendrick, J. Morgan, J. Bell, J. Shearman, A. Fielding, J. Tod, S. F. Walker, Ivor G. Williams, E. Kelly, Miller, T. Bowden Chicken, and others. The following

officers and members of the local committee, to whom much credit is due for the admirable character of the arrangements, were in attendance:—Mr. R. Davison, Mr. James Ferrier, Mr. R. J. Field, Mr. John M'Callum, Mr. W. Simpson, and Mr. A. E. Smithson; Mr. David M'Callum, representative to the council Mr. O. L. Ryder, hon. treasurer; and Mr. George Sloggett, the zealous and ever-courteous hon. secretary.

The loyal toasts having been submitted from the chair, Councillor Ramsdale, in the absence of Mr. John Gunn, gave the "Navy, Army, and Reserve Forces," to which Mr. A. J. Durston responded. He met with a very cordial reception. The poet had said, he observed, "Britannia needs no bulwarks," and this sentiment should be echoed by every subject of this mighty empire. Again, "Her home is on the deep," and the realization of that idea we might safely leave to the dash and daring and high sense of duty for which our naval commanders had ever been distinguished. The recent enlargement of the Navy had exhausted the powers of the naval training colleges and training ships to furnish the necessary addition to the *personnel*, and as they would have seen in last Tuesday's *Gazette*, many members of the Mercantile Marine and Royal Naval Reserve had been given commissions in her Majesty's Navy as lieutenants, sub-lieutenants, and midshipmen. The engineer branch of the Navy consisted of over 800 engineers, 2,000 artificers, and 15,000 stokers. The entries of artificers and stokers had been very satisfactory, and came from an outside source, as usual. The ranks of the engineers had been supplemented by entries direct from engineering shops throughout the country who had also had training in such technical colleges as that in which Professor Elliott played so important a part for South Wales and Monmouthshire. Then they had the marine engineers and their brother engineers of the Royal Naval Reserve to fall back upon. The Board of Admiralty had also decided upon new types of ships to be built, and the naval architects and engineers both in Royal dockyards and private yards endeavoured to accurately interpret and give effect to their instructions. Great changes and improvements had been and were being made. Guns and their mountings, from the smallest to the heaviest type, had been immensely



increased in effectiveness; gunpowder had been made smokeless; shot and shell possessed a greater penetrating power, and at the same time the resistance of armour had been considerably strengthened. The administration of the Government dockyards had been so improved that ships were being built and turned out in unprecedentedly short periods. The *Majestic* and *Magnificent*, two battleships of the first-class, had not been in hand two years and were nearly ready for commission. Private yards, too, were noted for their rapid construction. There was a recent instance in which no fewer than seven gunboats were built and equipped for a foreign power in the space of about ten weeks. Turning to machinery, this, he said, was a controversial topic, and perhaps should be tabooed, like politics. All he would say on this subject was that they were experiencing considerable changes, and that within a recent period had been adopted higher pressures and water-tube boilers suited to those pressures. Boilers of the smaller water-tube type had shown themselves suitable for fast torpedo-boat destroyers, and were also being used in vessels of the smaller cruiser type. While on this subject he would repeat, with their permission, what he said to the London members of the Institute on September 28th with respect to the *Sharpshooter*. This vessel had just completed, in satisfactory manner, in a series of trials, a thousand knots. Commencing with powers from the boilers in use which would represent 18,000 H.P., full working specified power, she wound up with powers representing over 25,000. That was the power specified for a short period—the maximum power. This meant that in the *Powerful* and *Terrible* this full power would be maintained not over a measured mile course only, nor yet for a spurt, but as long as coals remained in the ship to be burned. Mr. Durston concluded with the observation that, having the men and having the ships, and judging from the revenue returns, having the money too, the greatest victory that could be achieved in this preparedness for war was the glorious one of maintaining peace, whereby the Mercantile Marine, assisted by the marine engineers, might go forward to still greater successes than had even been accomplished in a remarkably successful past.

Dr. Macormack, in proposing "The Houses of Parliament," quoted from a letter sent to him a short time ago, in which the ex-member for Cardiff was referred to. "Sir Edward Reed," said the writer, "rendered noble service to the Navy. He was practically the founder of the Institute of Naval Architects. Whatever else we have to say, Parliament lost a good engineer when it lost Sir Edward Reed."

Mr. Maclean, M.P., responded to the toast. What had recently happened, he said, must have convinced everybody that the time had not come when the nation was tired of the House of Peers. Some of the very best men of business in either House were to be found in the House of Lords. No better examples could be met with anywhere than in Cardiff and the neighbourhood. There was nothing personal in the toast which had been just proposed; but if he had been inclined to feel any jealousy upon such an occasion he might perhaps have complained, in a slight degree, of the tone used by the proposer of the toast in his eulogy of the gentleman whom he had the honour to defeat at the last election. He entirely concurred, however, in the praises which the proposer of the toast had bestowed upon Sir Edward Reed. Nobody could doubt his eminence in the profession to which he had devoted himself, and, for his part, he had never hesitated to own his eminence in that respect. The proposer of the toast did not enumerate him (Mr. Maclean) amongst those in Parliament who were connected with the Marine Engineers' Institute or who knew a good deal about engineering; but there was a Scotch proverb which said that the world was made up of all sorts of people, and the same thing was true of the House of Commons. He believed that a good many people had been connected in their time with the profession of journalism, and who were, therefore, supposed to know every subject under the sun. Although he could not pretend to have any special knowledge of the engineering profession, yet nobody could excel him in the desire to do anything that might be for the good of the Mercantile Marine and the Imperial Navy.

Canon Thompson proposed "The Institute of Marine Engineers." In a humorous vein he observed that one reason he had pleasure in submitting this toast was that if it were not for the marine engineer most of them would not be able to get to Weston, and as for the Bristol Channel traffic, he should like to know where that would be. He emphasised the immense importance of the profession of marine engineering; and then spoke of the long and honourable connection with the representation

of Cardiff, of Sir Edward Reed, who was perhaps the most accomplished naval architect the century had produced. It was institutes like this that was fast making a name for Cardiff, but much remained to be done. Only the other day at Norwich, a lady moving in a somewhat high circle, said to him, "Cardiff, let me see, is not that somewhere near York?"

The Chairman, on rising to acknowledge the toast, was received with enthusiastic applause. He said that it was no little matter to be blessed by Canon Thompson—and to receive from him words of sound advice. The reverend gentleman had undertaken many works in his time for the benefit of mankind, and great had been his success, and it was peculiarly fitting that such words as he had spoken should have fallen from him that night. On former occasions he (the chairman) had dilated upon the centre system, which was once peculiar to the Institute of Marine Engineers as distinguished from the Institution of Civil Engineers, the Institution of Mechanical Engineers, the Institution of Naval Architects, and the Institution of Electrical Engineers. He had prophesied that those institutions would follow their example, and they flattered themselves by saying that imitation was the sincerest flattery, for in that week's issue of the engineering papers he found an announcement to the effect that the Institution of Civil Engineer Students' Association of Yorkshire would hold their second annual dinner at Leeds at no distant date, and that the chair would be taken by Sir Benjamin Baker, President of the Institution of Civil Engineers, and that all members and associate-members who could conveniently attend were expected to be present. Centres of the Institute of Marine Engineers had been established—as they knew—at Cardiff, then Southampton, and Bombay, an announcement that would be peculiarly interesting to their friend Mr. Maclean, who still retained a great interest in Bombay and in the affairs of the Indian Empire. Some time ago, well back in the history of the Bristol Channel Centre, his friend Mr. Joseph Williamson propounded a conundrum. He asked why was the Bristol Channel Centre like the House of Lords, and the parent Institute in London like the House of Commons? His answer was because they in Cardiff read Bills that had been passed by the parent Institute. But during the last and the previous session they had reversed all that. Cardiff had become the House of Commons, and, to a large extent, the parent Institute in London had become the House of Lords, because they had, in a large measure, been busily engaged in reading Bills, or papers, that had been sent up from Cardiff. One of these Bills was so good that it had been adjudged the best paper of the session, and been awarded the Denny gold medal—a paper read by a member of the Bristol Channel Centre. The success of a technical or scientific institution depended in a considerable measure upon the president. The older institutions had cast-iron rules and traditions, and it frequently happened in these institutions that young men, comparatively young men, who had done great service to their profession, who had risen above the shoulders even of their elders, by the accidents of life, and sometimes by death itself, were cut off before their names were even mentioned in connection with the presidential chair. In the Institution of Marine Engineers they pursued a different system. Their presidents were chosen simply for their professional standing. This had been of no small advantage to them. They had had Lord Kelvin, Mr. G. W. Manuel, Dr. Denny, and Sir William White, whose magnificent work was written in steel in the annals of the Navy, the designer of what was practically a new fleet of battleships and fighting craft of all descriptions. They sympathised with Sir William White in his indisposition, which they were delighted to know from Mr. Durston was likely to be only temporary. Now they had Mr. Durston, the Engineer-in-Chief of the Royal Navy. In addition to Mr. Durston's great duty as an executive officer, he had laid upon his shoulders the design, execution and the working of those mighty engines, that mighty machinery which had to put life into the creations of Sir Wm. White. Mr. Durston had discharged that duty to the satisfaction of his colleagues at the Admiralty, to the satisfaction of the Houses of Parliament, to the satisfaction of the country at large, and to the satisfaction of his professional brethren. It was a noble duty, nobly discharged. The Institute was proud of its president. He should like to say one word about Mr. Durston's Presidential address. The Presidential address, which of all others had attracted the most attention, was written in the thick of his arduous and responsible work. But it appealed to engineers because it was written in the thick of a great

work. It was written by an engineer for engineers. Clear statements, clear conclusions—it was the ideal of an engineer's document. In conclusion, he desired to say a word of welcome to the visitors, and in the name of the Institute to thank them for their presence, and for their support of a movement which they hoped to make as wide as the limits of the empire, because they desired to live to see the day when engineers sailing in all parts of the world would acknowledge allegiance to the Institute of Marine Engineers and salute their brothers as members thereof. He thanked the company for the hearty way in which they had responded to the toast, which he took to be a happy augury of the future of the Bristol Channel Centre and the Institute in general.

The toast was also acknowledged by

Mr. James Adamson, honorary secretary of the Institute, who said he considered the Institute of Marine Engineers highly favoured in respect to its public appearances during the present session. First, in that at the annual dinner held in London last month the toast of the evening was proposed and received amid thoughts connected with a glance from the sword of war and the noble aspirations called forth by the names of heroes who had made their lives memorable on the pages of our nation's history, not only for the work they had done, but for the principles underlying it—not for the carnage they had wrought, but for the greater misery they had prevented. Science was, and had been the handmaid of war, and it was becoming that an acknowledgment of indebtedness be made ere the time comes when the service should be reversed, and in place of the "science of war" we should speak of the "war of science," when, indeed, the policy of the individual as of the State should be constructive rather than destructive. Second, in that their president, whom they were delighted to have with them that night, as the head of the Engineer Department of the Navy, held a position which would add *clat* to any society of engineers with which he might be connected, more especially a society of marine engineers. The attention given by the technical press to his inaugural address showed the esteem in which he was held, and the importance attached to his utterances. Third, in that that evening they were honoured by a gleam from the sword of peace, and illumined by the rays of light proceeding therefrom urging them to nobler attainments in the future than even they had dreamed of in the past. If the sword of war pointed them to noble aspirations, that of peace pointed them to the most noble of all, and if the auspices of the former be good, those of the latter were better than the best they could conceive. Science was the handmaid of peace no less than of war, yet some of the professed exponents of science had bid defiance to the man of peace, decrying dogmatism with one breath, and claiming it with the next, forgetting, amid their splendid but human intelligence that the sum of knowledge was more boundless than the ocean, and the reachings of intelligence more limitless than the space of our imagination; and the struggling towards knowledge and intelligence was as the struggling of the finite towards the infinite. Did we not often find that the heterodoxy of one age became the orthodoxy of the next? The lessons set before them in contemplating the ideas conveyed by these three points alone were of the highest moment to them in connection with their progress and advancement as a body, and their prestige as an Institute. The foundation of the Institute rested upon this basis, and bore upon its corner-stones the principle that knowledge was an ever-increasing quantity added to by thoughtful experience, and that the sum of many experiences might be reckoned up for the advancement not of one only, but of the many. Time forbade that he should enlarge upon their aims and aspirations, their hopes and fears, their nobility of purpose and their freedom from the trammels which warped the judgment and impaired the intelligence, but he would suffer the portals of his lips to open while he said: may the Institute progress and go on preserving itself from the small-mindedness which tends to mediocrity and fossilisation, and pressing forward to the higher attainments of which it is capable. He thanked them in the name of the Institute for the good wishes expressed, and for the hospitable welcome accorded to the toast.

The presentation to Mr. Wailes of the Denny Gold Medal was then made by Mr. Durston, who remarked that this was the first occasion upon which the medal had been presented to a member of the Institute in Britain. It indicated the great progress which was being made by the Bristol Channel Centre.

Greeted with hearty cheering, Mr. Wailes accepted and acknowledged the presentation. He confessed that if he had not been

spurred on to the preparation of his paper by Professor Elliott and Mr. Sloggett, the local hon. secretary, he should not now be the proud holder of the Denny medal.

"The Municipality of Cardiff" was given by Professor Richards, and replied to by Councillor W. J. Trounce and Councillor Ramsdale.

It was at a late hour when Professor Galloway, in the unavoidable absence of Mr. John Duncan, proposed "The Ports and Trade of the Bristol Channel," and Mr. D. A. Thomas, M.P., president of the Cardiff Chamber of Commerce, with whose name and that of Captain Pomeroy, the toast was associated, confined himself to a very few observations. He did not know, he said, that he could describe the present condition of the staple trade of Cardiff as being of a rosy hue, but he held a very hopeful view of the future—a view, he believed, which was largely shared by those who were more competent judges of the signs of the times than he was. Every trade barometer was rising, every indication was pointing to better times—the railway returns, the Board of Trade and Revenue returns—and it could not be long before that district participated in the improved condition of affairs which was evidently being enjoyed in other places.

The next toast was that of "The University College of South Wales and Monmouthshire," submitted by Mr. J. M'Farlane Gray, who said they were asked to honour this toast because the Centre had its rooms at the College. It was peculiarly appropriate that the engineers should hold their meetings there; it was a contact of theory and practice. The theoretical and the practical men were becoming more closely associated. Engineers sometimes said theory was wrong, but it could never be wrong. When men began to look at the world and beheld the wonderful things in it, they asked themselves—"How does all this come about?" What were they looking for? They were looking for a theory, and they came to say, "All things are of God"—Theos; and Theos was the theory of the universe. The theory of anything was the bit of God that was in it; and this could never be wrong. Education was nowhere better described than in the old Jewish book which told us that if the axe be blunt, and one did not set an edge there, he must put forth more strength. It was the same with knowledge. There were schools where axes were ground in an ordinary way, but at University colleges axes were given the temper of attainment, and the sharpness of resource. The University College at Cardiff was doing very good work; and their thanks were especially due to Principal Jones—who was one of the greatest scientists of the day. What was the most exact determination of the ohm had been made by Principal Jones; and it was regarded as such all over the world.—He strongly urged all young engineers to lay up a store of knowledge. Their greatest wealth was not what they put in their pockets, but what they put in their heads.

Professor Alfred Hughes responded, and the remaining toasts were "The Chairman," proposed by Mr. Edmund Handcock, jun., and "The President of the Institute," proposed by the Chairman.

## ROW'S PATENT FRESH WATER CONDENSERS.

IT was once remarked by Vice-Chancellor Sir James Bacon, in his summing up in a Condenser patent case heard before him, that "condensers were as old as the hills and in fact they had often been used on the hills of Scotland and Ireland for the illicit production of whiskey." But be they old or not, it is evident that improvements continue to be made in the formation of condensing surfaces, the most recent, and we think a valuable improvement, is the patented form of tube invented by Mr. O. M. Row, the feature of the invention being the cross indentations as shown in the large illustration of the single tube which disposes of the idle core of the ordinary round tube and forms an impinging surface both inside and outside the tube in its natural thickness without having resource to gills or affixed baffles, and at the same time securing a strong and elastic tube. The increase of efficiency as a heating or cooling medium is more

than double that of the same area of surface of plain, straight, or coiled tube.

The patentee has had intimate connection with the manufacture of fresh water condensers, feed-heaters and evaporators for a number of years, and has had opportunity to test the various forms of surface under actual working conditions and has no doubt obtained valuable information from personal observation.

The fresh water condenser which we have the pleasure to illustrate, is remarkably simple in its construction and has obtained the approval and sanction of the Board of Trade for passenger ships and is adopted on many of the important lines of steamers, British and foreign.



The condenser consists of a plain shell in three parts, viz., base forming the filter chamber, body to contain the tubes and having inlet and outlet branches for the circulating water and a cover forming inlet chamber for steam supply to condensing tubes. The condensing tubes are indented under Row's patent from solid drawn copper with brazed metal caps on both ends, and connected to tube plates at each end of body with gun-metal nipples and nuts. All the surfaces of the tubes are also thoroughly coated with pure block tin. The peculiarly uneven surfaces prove most effectual in casting the sea water scale which tends to adhere to ordinary condensing surfaces. The circulation of the cooling water is in the opposite direction to the condensing steam so that the coldest of the cooling water acts on the coldest condensation.

These condensers are made in eleven sizes capable

of yielding from 500 gallons to 10,000 gallons per day of 24 hours. They are compact and neat and properly proportioned for strength of parts and the prices should tempt buyers.

These condensers are being made together with the feed-heaters, evaporators, &c., under Mr. Row's personal supervision, by Mr. John J. Royle, of Dalham Engineering Works, Great Bridgewater Street, Manchester.

### THE TORPEDO-BOAT DESTROYER "SOKOL."

THROUGH the courtesy of the builders we were enabled to attend a recent trial of this vessel.

Built and engined by Messrs. Yarrow & Co., of Poplar, for the Imperial Russian Government, the *Sokol* claimed on the date of her first official trials to be the fastest vessel in the world, having achieved the then unprecedented speed of 30.28 knots per hour.

Our plate illustration is prepared from a photograph showing the *Sokol* in sea-going order, when, her length and beam being 190 ft., and 18 ft. 6 in. respectively, she will displace 240 tons.

The twin screws are driven by two sets of triple-expansion engines, having cylinders 18 in., 26 in. and 39½ in. in diameter by 18 in. stroke. The exhaust from both engines passes into one condenser provided with one centrifugal pump. The condenser is of copper made by the Elmore electro-deposition process, and has corrugations suitably worked in to stiffen it.

The usual air-compressors, electric light, distilling, and other auxiliary machinery finds place in the engine-room, which we were agreeably surprised to find less crowded than we expected.

The steam steering gear is novel, the device for changing from steam to hand having been much simplified by the builders, whose careful supervision throughout is apparent in every detail of the vessel.

The boilers, of the well-known Yarrow water-tube type, eight in number, are placed four in each of two watertight compartments occupying the midships of the vessel. These are straight tube boilers, easily examined and cleaned, designed for a working pressure of 200 lbs. per square inch. The eight boilers, weighing, including water and mountings, 45 tons, are collectively capable of developing with ease 4,500 H.P., and are enclosed by cross bulkheads in front, thus shutting them off from the stokeholds and ensuring, in the event of a boiler being damaged by shot, that the escaping steam will pass up the chimney and not out and amongst the stokers. The bunkers, arranged on each side of the boilers, will hold 60 tons of coal—sufficient to steam the vessel across the Atlantic at about 10 knots speed.

To minimise weight the hull, divided into eleven watertight compartments, is built throughout of nickel steel and this being stiffer and stronger than ordinary mild steel allowed of a reduction in the scantlings without decreasing the strength of the structure; with the same object aluminium has been extensively used wherever practicable, the side scuttles, bunker lids and rings, ejectors, cylinder casings, etc., being constructed of this lightest of metals.

In the engines themselves a considerable saving of weight has been effected by an alteration in

motion and a modification of Mr. Yarrow's original method of balancing, and by the substitution of the stronger bronze mixtures for brass.

One weight-saving device struck us as being particularly ingenious, namely, fixing the forced-draught engine on the stokehold floor, and driving the fan placed (in the deck) horizontally above it with a vertical shaft. Formerly engine and fan were placed on deck, necessitating considerable local strengthening and extra weight of deck beams.

The armament consists of a 12-pounder quick-firing gun mounted on the conning tower forward. From its elevated position, and having an all-round fire, this should prove a very effective weapon. Three 6-pounder quick-firers are mounted on the deck as well as two swivel torpedo launching tubes, one forward and one aft.

During the official trials three runs were first made on the measured mile, then a straight run of  $2\frac{1}{2}$  hours duration was made, and this was immediately followed by a second set of three runs on the mile. The mean revolutions per minute on the first three miles was 399, and the mean speed 29.445 knots, and on the last three miles the mean revolutions reached 411 per minute, and the mean speed 30.102 knots, giving a mean for the six measured miles of 405 revolutions, and 29.777 knots. The true mean speed of the vessel during the whole of the three hours she was continuously under weigh was 29.762 knots, the highest and lowest speeds reading 32 and 27.48 knots respectively.

The mean steam pressure in the boilers throughout the trials was 160 lbs., and the air pressure in the stokeholds equalled 1.375 in. The coal burned during the three hours' full-speed run was 10 tons 7 cwt.

On the trials we attended the vessel attained with open stokeholds a speed of 20.5 knots, the engines running at 274 revolutions and indicating 1,050 H.P., and with  $\frac{1}{2}$  in. air pressure in the stokeholds a speed of 26.7 knots was obtained, the engines at this speed showing 359 revolutions and the I.H.P. rising to 2,650, both trials being of half-an-hour's duration.

### FIRST-CLASS TORPEDO BOATS FOR THE ROYAL NAVY.

THROUGH the courtesy of the builder, Mr. J. S. White, of East Cowes, Isle of Wight, we are enabled to prepare the accompanying plate illustration by reproducing a photograph, taken when steaming at full speed, of one of the three first-class torpedo boats constructed by him for H.M.'s Navy, and known officially by their service numbers as "94," "95," and "96."

Though long on the lists as an excellent constructor of smaller craft, and judging by the measure of patronage accorded him, the Admiralty officials evidently have, in common with all his other patrons, every reason to be well satisfied with his productions, and Mr. White's yard may now be regarded as one where, in case of national emergency, vessels of such size and character could be rapidly and efficiently produced.

The vessel shown in our illustration—the three are identical—has a length of 145 ft., and 15 ft. beam, and attained a mean speed of 23.25 knots on a three hours' continuous run, with 24 tons on board.

The machinery, by Messrs. Maudslay, Sons & Field, is of the triple-expansion type, steam being supplied by two loco-type boilers, the whole being collectively capable of developing 2,000 I.H.P., when running at the speed mentioned.

The vessels are each equipped with the usual complement of quick-firing guns, torpedo tubes, search light, etc., in accordance with Admiralty requirements, and on the official trials and during the naval manoeuvres, the behaviour of the vessels and machinery was considered to be throughout of a highly satisfactory nature.

### NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondent.)

#### Merchant Marine Officers for the Navy.

THE Naval authorities have at length, and in spite of much adverse criticism, taken the step for which power was granted them by the order in Council for forming a supplementary list of naval executive officers. One hundred officers from the Mercantile Marine, the great majority being Royal Naval Reserve men, have been granted commissions in the Royal Navy as lieutenants and sub-lieutenants. These gentlemen have, as a rule, been selected from the great companies like the P. & O. and British India Steamship lines, and many of them have already served for shorter or longer terms in men-of-war. Their fitness from a social point of view, has never been in doubt with those who knew anything about the Merchant Marine, and it goes without saying that regarded in a professional aspect, there can be no question as to their nautical experience and ability. What they must lack is naval training, and for some years, doubtless the captains and commanders of our men-of-war will be somewhat apprehensive when they know that they have an officer from the supplemental list on the bridge. In time this feeling will wear off, and then, but only then, will this altogether new and unprecedented step be held to be justified fully and completely.

#### Navigators and Engineers.

Two points have arisen in regard to this entry of merchant officers in the discussion in the newspapers which has naturally followed the promulgation of the order for their admission to the regular service. The first is a renewal of the agitation for a re-establishment of a separate navigating branch of officers, a branch which was done away with some years ago, and so far as can be seen with excellent results. It is, however, now proposed, to re-establish the separate branch, mainly, it may be supposed, for the purpose of placing in it the new comers whose special training is held to fit them more particularly for this line of work. At present the subject has got no further than discussion in the newspapers, but no evidence has yet been adduced that the plan now in vogue has failed. The second point refers to the future of the officers now placed on the supplemental list, who, it is contended, cannot fail in time to be amalgamated regularly with the ordinary officers just in the same way that engineers for temporary service were. If this is done it cannot fail to increase the discontent already felt by those officers of the regular list who are aggrieved at the better terms offered to and accepted by the new men. As in the case of the engineers, this is likely to give rise to much heart burning, and we shall certainly hear more about it in the future.

#### Portsmouth Dockyard.

Visits of Admiralty Lords, which have recently been made in a fitful manner, tell of preparations for coming Estimates, but it is doubtful whether next year will see any largely increased programme. Meantime there are indications that the ships under construction are to be pushed on, and that several of those in the Fleet Reserve will hoist the pennant. The *Majestic* has made

all her trials and is to be ready for commissioning on December 12th. Begun on February 5th, 1894, this vessel will beat the Portsmouth record. The *Prince George* is to be ready for her trials in March next, and progress on the *Cæsar* is more rapid. This ship's armour plates and those for the *Illustrious*, building at Chatham, have been ordered from the manufacturers at Sheffield. Of the cruisers, the *Eclipse*, which began with a rush, has been so delayed in construction that it is probable she will now eclipse her sister ships only in regard to the matter of cost. The old *Sultan* has at length finished her four years' refit and has taken in her old armament. The *Pallas* and the *Iron Duke* have made steam basin trials after refit, and the *Warrior* is at last to be taken in hand. The drawings of the *Gladiator*, a sister to the *Furious* and *Arrogant* cruisers, have arrived in the yard, and the ship will be laid down on the slip from which the *Prince George* was launched. The ships of the Channel and Training Squadrons have given some work, but have now left for sea. It is expected that the *Majestic*, *Royal Oak* and *Revenge* will hoist the pennant in December, and the *Narcissus*, *Imperieuse* and *Cordelia* in November.

#### More Torpedo-Boat Destroyers.

When the first batch of torpedo-boat destroyers turned out so successfully the First Lord of the Admiralty stated that it had been determined by the authorities to bring the total up to 62, an announcement which was hailed by the country with great pleasure. The Naval authorities, however, rather reckoned without their host, for when tenders were invited for building the last 20 ships only three firms cared to undertake the work. The truth is, of course, that building these destroyers is not a paying business. The firms that had made it pay, or at all events intended to try and do so, are Messrs. Laird Bros., of Birkenhead, Messrs. J. & G. Thomson, of Clydebank, and Messrs. Thornycroft, of Chiswick, and each firm undertook to build four boats. At Birkenhead are building the *Quail*, *Sparrow Hawk*, *Thrasher*, and *Virago* of 300 tons displacement, 6,000 H.P., and 30 knots speed on a three hours' run. At Clydebank, the *Brasen*, *Electra*, *Recruit*, and *Vulture* of 300 tons displacement, 5,800 H.P., and 30 knots speed. On the Thames are the *Desperate*, *Fame*, *Foam*, and *Mallard* of 272 tons displacement, 5,400 H.P., and 30 knots speed. Messrs. Laird have already launched two of their ships, and when completed the Clydebank boats will go to Portsmouth, those from Laird's to Devonport, and the Thames boats to Chatham.

#### The Defence of the Medway.

The boom which is to prevent torpedo craft from ascending the river Medway, and destroying or injuring the ships in the Reserve has been completed and was recently tested to ascertain its value for defence purposes. This monster obstacle is composed of balks of timber fastened together with wire hawsers and entanglements, the whole being supported by a number of obsolete gunboats moored in the stream. The structure was put together in parts or sections, and placed in position and then tested, when it was found to answer most satisfactorily the trials made. Similar booms are to be built at Portsmouth and Devonport, and now that the Medway defence is found a success, they will be hurried on, portions of them being prepared at Sheerness, which yard has already experience in this direction. The Medway boom has been taken to pieces again and the whole stored away, so that no great time will be lost in reconstructing it, and linking up the component parts. It is considered probable that the boom will be put in place at least once a year.

#### Devonport Dockyard.

Next year we may certainly expect to see a real start made with the extension works at Keyham, for tenders have been invited and other preparations are in progress. When these improvements are completed, and they will take about ten years to finish, the West-country yard will have attained proportions more in keeping with the work it has to do. In the meanwhile the new gun-mounting store has been connected with the main line of railway so that the gun-mountings of ships can be run right into the store from the manufacturers. The *Phoenix* and *Algerine*, especially the former, are making good progress, their quick-firing ordnance has been delivered in the yard and the *Phoenix* is already provided with the mountings for her guns. Further applications has, however, been made for the postponement of the completion of these vessels. The *Arrogant* and

*Furious* also grow apace, the air-compressing machinery, electric lighting machinery, and distilling machinery, all supplied by Messrs. Earles, of Hull, has been sent into the yard. Of the two ships, the *Arrogant* grows the fastest at present. Tubes for the boilers of the *Brisk* are to be supplied from Keyham, and plates for the boilers of the *Alecto*, made here, have been shipped for Bathurst to be put into the ship there. The *Rocket*, *Shark*, and *Surly*, are also to be fitted at Keyham with new boiler tubes. Of ships under repair or in the reserve, the *Astrea* is to be commissioned in November, and so is the *Curacoa*, the former for the Mediterranean and the latter for the West Indies. The *Rupert* is to be completed this month to take the place of guard-ship at Gibraltar. A new gun is to be supplied to the *Spider*, and the defects in the *Sharpshooter* and several other vessels have been in hand. We have also had the West-country contingent of the Channel Squadron in here for similar work.

#### Training Ship for Stokers.

A new departure is about to be made in connection with the training of stokers for employment in ships fitted with water-tube boilers. The trials of the *Sharpshooter*, which ship, as the readers of the MARINE ENGINEER are aware, has made a thousand miles run to test the value of the Belleville boiler, having come to a satisfactory conclusion, she is to be attached to Portsmouth so that a selected number of engine-room ratings can make themselves acquainted with the working of the boilers. As the *Powerful* and *Terrible*, as well as others of the projected cruisers will be fitted with water-tube boilers, it was quite time that a step of this description should be taken. Artificers and stokers, as well as engineer officers, will be able by runs in the *Sharpshooter* to gain that amount of instruction and experience which will fit them to get the very best results out of the new ships when the year after next they are ready for trial and commissioning. The tests to which the *Sharpshooter* has been subjected, as well as the experience gained in the torpedo-boat destroyers and catchers, like the *Speedy*, have all demonstrated the success of the new boiler, although their maximum capabilities are as yet far from being wholly ascertained. The horse power per ton of boiler, and the speed attained per consumption of coal with the new system is a long way ahead of anything yet attained with the locomotive boiler and other advantages are becoming more and more apparent.

#### Chatham Dockyard.

The event of last month at this yard was of course the successful launching of the battleship *Victorious*, referred to elsewhere. Considering that she is the heaviest ship ever launched from the yard everyone concerned is to be congratulated on the complete success which attended the undertaking. Almost equal interest is felt in the approaching completion of the *Magnificent*, which vessel has now made her gun trials, and it is hoped may be completed by November 23rd, in which case she will beat the record abroad by being ready for sea in less than two years from date of laying down. This result for the fastest and heaviest ship in the world will be something to brag about at Chatham. Good progress is also being made with our third battleship, the *Illustrious*, which is so far advanced that her armour plates have been ordered. The cruiser *Minerva* will, it is expected, also make a record. Her machinery, built in the yard, was ready for her before her float out, and is now placed on board. The drawings of the *Vindictive*, have been received and this 5,260-ton cruiser will be commenced as soon as possible. Of refits, that of the *Sans Pareil* is progressing rapidly and her quick-firing guns have been supplied. Hand loading mechanism is to be furnished to the *Benbow* for her 110-ton guns. The *Tyne* refit is complete and that ship has left the yard. The *Euryalus* is being made ready to receive 400 boys, as a training ship for Queenstown. The *Grafton* having returned from her trip to the Mediterranean with new crews is being prepared for a similar errand to China. The *Immortalité* and *Severn* are being got ready for commission and will hoist the pennant in November. The *Leander* from China has arrived to pay off. Several torpedo gunboats have made their trials, and the *Grasshopper* is being fitted with a new gun for exercise. The *Lightning* torpedo-gunboat has been delivered by her constructors.

#### The "Satellite's" Screw Shaft.

The news that the *Satellite* has become disabled by the breaking of her shaft is thus commented upon by the Naval writer of the *Globe*, whose knowledge of the history of Naval



engineering is probably second to none. "The circumstance is almost unique for the last 85 years in the history of the Royal Navy. The only instances I can recollect during that period are those of a small storeship, named, I think, the *Wye*, and brought into service for employment on the Mediterranean station, and the two-decked line-of-battle ship, *James Watt*, in about the same year, 1860. The engines of the latter vessel were built by Messrs. Boulton & Watt, of Soho, Birmingham, who were entrusted with the contract on account of the ship's name. The *Satellite* is an old useless sloop of 1,420 tons and 950 H.P. She was built at Chatham in 1881, so that the giving way of her shaft can hardly be held to be an accident for which the constructors of her machinery, Messrs. Humphrys, are responsible. Common as this class of breakdown is in the Mercantile Marine, it is, as I have said, almost unknown in the Navy. There are three probable reasons for this. More care is taken about the manufacture of shafts for the Navy than for the merchant service; more pains are bestowed on laying the shafts absolutely level in the ships; and, most important of all, naval engines are very seldom run at full speed."

#### The Tubes of Torpedo-boat Destroyers' Boilers.

With reference to the statement in a contemporary that "leakages in the tubes caused the boats fitted with Normand boilers to be very unsatisfactory performers," Messrs. Laird Bros. of Birkenhead, write as follows:—"As four of the boats, built by us for the Admiralty, were out in the manoeuvres and no such report has officially or otherwise reached us, we have reason to believe they did as well in the manoeuvres, when commissioned, as they did during our prolonged and exhaustive official trials, some on the Mersey, some on the Clyde, and others at the mouth of the Thames, and during the somewhat lengthened sea trips consequent on such trips; in fact gave absolutely complete satisfaction. It seems strange to put forward a general statement so calculated to injure the credit of one of the most successful systems of boilers introduced for torpedo-boat destroyers for our Navy and elsewhere." The trials of their boats and their general behaviour during the manoeuvres have been reported from time to time in the *MARINE ENGINEER*, so that there is little fear of our readers being misled by the statement to which Messrs. Laird very properly take objection.

#### Aluminium for Torpedo Boats.

The evidence as to the value of aluminium for the construction of torpedo-boats and other small craft, is at present very contradictory. From America, we learn that immersion in salt water has had a most disastrous effect upon the fittings of certain vessels made of this metal, and moreover, that in regard to the three boats wholly constructed of aluminium which were used in Mr. Walter Wellman's Arctic expedition, examination of them at Washington showed that owing to the great deterioration which had taken place, the material actually crumbled to pieces in the hand. On the other side, Mr. Yarrow asserts that the French Government are so pleased with the boats he has built for its Navy of this metal, that they have placed an order with his firm for three more of similar construction. In all likelihood the cause of these different reports is to be found in the degree of care taken of the boats by their owners, and possibly to some extent in the actual material used. Pure aluminium is said to resist corrosion better than alloys in which aluminium forms part, and only experience and trial can show how far this contention is justified by facts.

#### Pembroke Dockyard.

There is now plenty of work in this yard and there are also indications that the authorities have determined that it shall have a chance to enter into competition with other building yards in the matter of the rate of construction. The abnormally long time that the *Renown* has been building is a standing reproach to the yard, but given fair play there is no reason why a record should not be made with the *Hannibal* and *Andromeda*. The last-named ship has now been laid down, the first consignment of plates having been delivered by the Dowlais Co. at Cardiff. The system ordered to be carried out with the new ship is an improvement on the old in many ways, and even the removal of the rivetting machine nearer to its work may be taken as a sign that better things are expected and intended. The trials of the *Renown* will take place very shortly, for she has been supplied with coal and water, a necessary preliminary which everyone understands. The *Hannibal* grows fairly quickly,

although not as quickly as some of the more energetic hands in the yard would like to see. What we lack here is the stimulus of constant newspaper reports. If the doings in the yard received as much attention from London papers as do those of Portsmouth, Devonport and Chatham, we should see an end to the old "Sleepy Hollow" ways.

#### Launch of the 'Victoria.'

This splendid battleship, which was launched at Chatham on October 19th, is the fourth vessel of the *Majestic* class to take the water. The ceremony of christening her was performed by Mrs. Goschen, wife of the First Lord of the Admiralty, in the presence of a distinguished company. Sir W. H. White, whose continued illness we all deplore, was unfortunately prevented from attending. She is a twin-screw, armour-plated ship, 390 ft. long between perpendiculars, and more than 420 ft. over all, her beam is 75 ft. and mean draught of water 27 ft. 6 in., the displacement at normal draught being 15,000 tons. The contract for her armour, about 3,000 tons, was placed with Messrs. Cammell, of Sheffield, and the kind used is that known as Harveyed solid face hardened steel. The armament, from Woolwich, is mounted and worked by machinery supplied from the Elswick works of Sir W. Armstrong, Mitchell & Co., Limited, and is of the same make as that which has been tried with success in the *Magnificent* and *Majestic*, her sister ships. The machinery is supplied by Messrs. Hawthorne, Leslie & Co., of Newcastle, and will develop 12,000 I.H.P., estimated to give a speed of 17½ knots. The normal coal capacity is 1,890 tons. The steam capstans, windlass, and cable gear has been supplied and will be fitted on board by Messrs. Baxter's, Limited, of Sandiacre, Nottingham.

#### Some Trials and New Constructions.

Very few steam trials in addition to those already mentioned elsewhere were made last month, but it may be observed that the *Majestic* has now completed her 30-hours trial, delayed by the sand getting in her condensing tubes when she took the ground. The torpedo-boat destroyer *Starfish*, built at Barrow, the last of the three built by this company, has completed her trials on the Clyde and is nearly ready for delivery. Since the *Minerva* was floated out at Chatham on September 23rd, Messrs. Laird, of Birkenhead, have made a record with a 30-knot destroyer, the *Quail*, which was launched in 88 days from laying down on September 24th, and the *Sparrow Hawk* on October 8th. Messrs. Hawthorne, Leslie & Co. have launched the *Ranger*, a torpedo-boat destroyer following the *Swanfish* and *Opossum*. Messrs. Doxford, at Sunderland, have launched the *Haughty*, and at Elswick the *Spitfire* and *Swordfish* are in hand. The next launch by contractors will probably be the *June* cruiser, following the *Venus*, already in the water in the Clyde. Tenders have also been invited for the construction of the three first-class cruisers of the *Andromeda* class, which are to be built by contract.

#### Sheerness Dockyard.

Building at the yard is confined to the third-class cruiser *Pelorus*, which will take the water in January, and is to be ready for commissioning in the following June. As soon as she is launched the *Proserpine* will take her place on the stocks, and this vessel is to be fitted with Thornycroft water-tube boilers. The *Comus*, which was commissioned here, is the first vessel to hoist the pennant in the yard since the *Tourmaline*, but the *Champion* refitted has now taken the place of the *Ruby* in the Training Squadron, and the last named vessel has joined the *Egeria* in the Dockyard Reserve. The *Wye*, also refitted here, has left for Ascension. On the whole I may say that we have been exceptionally busy, for in addition to the ships of the Channel Squadron which remained here instead of going up to Chatham, the *Tyne*, *Sappho*, and *Icarus* have passed through with short stays, and the *Magnificent* and several torpedo-boat destroyers have been here for trials. The refit of the *Sheldrake* is complete, but it is expected the *Severn* will refit here, and the *Niger* has also been under repair. Additional work of a kind is also supplied by the booms, which are to be manufactured here for the defences of the ports to the westward.

**Earle's Shipbuilding and Engineering Co., Limited.**—We are informed that this company has opened London offices at 141, Fenchurch Street, where Mr. W. T. Thackeray will act as their representative, and further, that Captain S. Eardley-Wilmot, R.N., late of the Intelligence Department of the Admiralty, has joined the directorate of the company.

## INTERNAL FRICTION IN STEAM ENGINES.\*

By MR. WALTER WILLIAM HOUFE (MEMBER, HONG KONG).

IN this paper I propose to deal in a practical manner with the subject of Internal Friction in Steam Engines, being of opinion that it has hitherto received too little attention. I am of opinion that internal friction in present-day engines is far in excess of what it should be, and that by its reduction economy would be attained in the working of the saturated steam engine, besides rendering possible the success of the dry or superheated steam engine.

All who have dealt with the theory of the steam engine have pointed out the benefit of the use of superheated steam. But the few attempts that have been made to adopt it were abandoned on account of the abrasion of the internal sliding surfaces. The best results in steam economy in the modern marine engine have been attributed to steam jacketing, which, as shown by Mr. W. H. Northcott in his valuable paper on "Initial Condensation," tends to do away with liquefaction of the steam in the engine, but that it is questionable whether it could be entirely prevented by jacketing alone. That the time to give superheated steam a fair trial, with every means known to prevent the former drawback, has arrived is evident, if much increase in steam economy is to be looked for. In a paper read at the Institute of Engineers and Shipbuilders of Hong Kong in 1893, when dealing with the Pacific Co.'s *Magellan* and *Patagonia*, which were built and engined by Messrs. Randolph & Elder in 1868, it was said:—"I well remember the talk at the time about the high pressure of steam adopted, namely, 75 lbs. per square inch, and how the *Magellan*, on her first run, so tore the faces of cylinders and valves, between Liverpool and Bordeaux, that the engines would not reverse. At Bordeaux the engineers were engaged for three days chipping and filing the faces to something like working condition. The damage was due to the superheated steam from a superheater in the uptake; it was so dry that it cut the faces to a far greater extent than saturated steam of 200 lbs. pressure would do, &c. . . . These steamers were the terror of all engineers in those days."

Although the term "cut" is used latterly, no doubt the term "abraded" would express what took place more to our minds, up to leakage becoming considerable anyhow, since we generally apply it to excessive wear (tearing). To account for the fact that abrasion will take place at the internal rubbing surfaces, with superheated steam of temperatures corresponding to those of saturated steam daily in use, it has been advanced that it is due to the lubricating action of saturated steam or to the moisture attending its use. In Professor Jamieson's text-book, "Steam and Steam Engines" (page 108), he refers to the proceedings of the Institute of Engineers and Shipbuilders of Scotland (January and February, 1886), and states:—"A moderate amount of liquefaction in the high and intermediate cylinders of compound or multiple expansion engines is, however, considered by the best practical engineers of the day rather an advantage than otherwise, for it helps to automatically lubricate the moving parts, and, therefore, to dispense with the necessity of using large quantities of oil." In Mr. Munro Ross's paper, read at the Institute (No. 46, page 12), he states:—"In the present day, with steam of very high temperatures, little or perhaps no internal lubrication is necessary. Many engineers have entirely discarded the supply through the impermeators. But with this I do not agree. Granted that high-pressure steam requires no oil; when this steam reaches the low-pressure engine, the temperature has decreased greatly, and here it is that I find the most mischief takes place." Undoubtedly, saturated steam of very high temperatures is here meant.

From these quotations, and what one may hear advanced daily, the general opinion may be taken to be that either the water from liquefaction or the saturated steam itself acts as an unguent to the internal rubbing surfaces. That the internal rubbing surfaces as a whole are probably void of water film for at least the greater part of every revolution, and that, where present, it would not act as a lubricant, has evidently been overlooked by many of us, including the best practical engineers of 1886, alluded to by Professor Jamieson. Without doubt, water film is deposited on unjacketed cylinder barrel surfaces where saturated steam is

used during the admission period, but as certainly it is re-evaporated during expansion and exhaust, and in most engines probably wholly by the end of that stroke, so that the barrel surface over which the piston is about to pass on its return stroke cannot well be imagined to have any water film left adherent to it. The same follows for both strokes, so that it may be taken generally that the piston path is continually over a barrel surface void of water film (save perhaps for a very small part in the end of each stroke where compression is taking place). Piston and tail end rods will be subject to the same tendency where their glands are tight and do not form pockets for condensed steam. The valve and cylinder faces will probably be alternately free from, and wet with, water film at their different bars according to whether they were last in contact with the exhaust or working steam. With priming or super-saturated steam engines no doubt all the internal rubbing surfaces tend to be continually wet.

As to water being an unguent for metal surfaces, Prof. Rankine, in his "Manual of the Steam Engine," &c. (page 16), says:—"Water, which acts as an unguent on the surfaces of wood and leather. It is not, however, an unguent for a pair of metallic surfaces, for when applied to them it increases their friction." That this is so I think there can be no doubt, for experimental results all show a higher co-efficient for a pair of metallic surfaces wet than when dry, and in acknowledgment of it we bush stern tubes and feathering float gear with lignum vitae.

Since it is clear that water increases friction in metal pairs, the liquefaction of steam in the engine, whether deposited and retained in part as water film on the working surfaces or held suspended in the steam, cannot lubricate the internal moving parts, but it will anti-lubricate them. As to steam being a lubricant for these parts, the wetter the steam the more water there will be suspended in it, and since water anti-lubricates them, the wetter the steam the more complete will be its anti-lubricating action. The drier the steam, the less the water suspended in it, and, consequently, the less anti-lubricating it will be. Since it appears that dry steam is not a lubricant for these internal parts, I conclude that steam, whether superheated, saturated or super-saturated, no matter of what temperature, is not a lubricant for the internal surfaces in a steam engine. As the tendency to excessive wear or abrasion of the internal sliding surfaces has been found greater when using dry or superheated than with wet or saturated steam, and as this cannot be due to the hitherto advanced opinions that saturated steam or the water of its liquefaction acts automatically in lubricating these parts, the reason must be looked for elsewhere. My inquiries lead me to believe:—

1. That abrasion (as here understood) of metal pairs takes place when the drag of friction overcomes the cohesive force of considerable sized particles of the metal's surfaces or surface.
2. That abrasion is aggravated by the metal becoming overheated.
3. That overheating is due to the fact that excessive difference of temperature in the generating and transmitting mediums are often necessary in order that the rate of heat generation and dissipation may arrive at a state of equilibrium.
4. That the rate of final dissipation of heat is tremendously greater in water than in dry air or in dry steam, moist air and super-saturated steam being somewhere intermediate.
5. That the reason the internal rubbing surfaces have been found to wear far more with superheated than saturated steam, even though the rates of generation be the same, is due to the fact that wet steam and the attending water of its liquefaction are far more rapid dissipators of heat than is superheated or dry steam, even though their temperatures be the same; consequently, the surfaces in the former case must be much cooler than in the latter case.
6. That the heat returned to the steam by friction of the internal surfaces does not result in economy proper as is sometimes imagined.
7. That considerable increase in steam-engine economy will attend the reduction of internal friction, and the way be paved for the success of the superheated steam engine. This reduction may be effected by good design of parts and a good system of lubrication.

\* Read at the Institute of Marine Engineers, Romford Road, Stratford, on Monday, October 14th, 1895.

1. All metals have a cohesive force peculiar to themselves, and the greater this force in any

force necessary to disintegrate it. But as all metals are capable of most minute subdivisions the slightest force will detach very minute particles when applied in a proper manner. As the force increases or the cohesion of the particles diminishes so will the disintegration increase. For example, the frictional resistance of an old file over a piece of metal may be so slight that only the most minute particles are rubbed off, but if the resistance be increased by great normal pressure the particles rubbed off may assume considerable dimensions and come within the limits of the term abrasion, as here understood.

2. All metals have a temperature at which the cohesive force of their particles is a maximum, and with metals that concern us here this seems to decrease as their temperatures rise above the ordinary atmospheric temperature. It is also highly probable that the frictional resistance of metal pairs undergoes considerable changes with alterations of temperature, and I am inclined to believe that variation of temperature difference in them increases frictional resistance to motion. Although we have no experimental data of the effect of temperature, &c., on frictional resistance, it has become general to add to the old written laws of friction "so long as the surfaces are kept cool." The term overheated is necessarily somewhat vague, but may be considered as a certain condition of temperature at which, in a rubbing pair frictional resistance becomes suddenly or greatly augmented. In order to convince oneself that abrasion is aggravated by heating, it is only necessary to recollect how much more easily iron is rasped down with an old file hot than when cold.

In order to make my further views plain, I propose to take data from an existing engine.

The steam engine giving the indicator diagram from which the absolute steam pressures on the Figure 1 are taken had a cylinder 14 in. diameter and 30 in. stroke; connecting rod ratio to crank 4, 1, and ran 90 revolutions per minute; the shoe a rubbing surface of 9 in. by 12 in. = 108 square inches, and the guide one of 42 in. by 9 in. = 378 square inches. The maximum shoe-load was, approximately,  $14^3 \pi \cdot (154 \cdot 68)^{\frac{1}{2}} = 3,310$  lbs., and the mean, roughly,  $\frac{3,310}{2} = 1,655$  lbs. With the surfaces well oiled, the frictional work is  $1,655 \times 2 \cdot 5 \times \cdot 05 = 207$  ft. lbs. per stroke, and the heat units generated  $\frac{207}{772} = \cdot 268$  per stroke. As the respective areas of this sliding pair are 378 and 108 square inches, and the heat generated between them must be generated in each surface in inverse proportion of their respective areas to the total rubbing surface area, the heat generated in the shoe will be  $\cdot 268 \times \frac{378}{378 + 108} = \cdot 209$  units per stroke, or  $\cdot 209 \times 2 \times 90 = 37 \cdot 62$  heat units per minute.

(To be continued.)

**French Battleship.**—On October 5th the French battleship *Charlemagne* (11,180 metric tons) was launched at Brest. Designed by M. Thibaudier, director of the arsenal at Rochefort—who is also the author of the plans of the cruisers *Charner*, *Breiz*, *Chanzy*, *Latouche-Treville* and *Pothuau*—she was intended to be one of the three battleships of a new type, her sisters being the *Saint Louis* and *Henry IV.*; but the last-named has been designed afresh upon a smaller displacement. The length of the *Charlemagne*, 385 ft. 6 in., exceeds that of any other French battleship yet afloat, and she is built upon finer lines than her predecessors, her beam being 67 ft. 6 in. The dimensions of the *Jawreguiberry* are 356 ft. and 72 ft. 8 in. This new character, which permits greater possibilities of speed, is made possible by a redistribution of the armament. In recent French battleships the heavy guns have been placed singly in turrets or barbets, two in the keel line of the ship, fore and aft, and one on each beam; but in the *Charlemagne* and her sister—as well as in the *Gaulois*, which is to be laid down on the slip which the first of these vacates—the English system of coupled guns has been adopted. Four 11·81-in. guns are thus to be mounted, in two closed turrets, both well above the water line, for the vessel has high freeboard, the type of the *navire à plage*—of which the *Hoche* is an example—being now definitely abandoned. In addition, the *Charlemagne* will carry ten 5·5-in. quick-firers, of which eight will be in the battery and two on the upper deck. Those in the battery are to be in separate compartments, so that

the danger from bursting shell may be reduced, and the external protection will be 3-in. plating; but it seems a defect of the design that an unprotected space below this plating, and between it and the side armour proper, will allow shells to enter beneath the battery. Two of the 5·5-in. guns will be placed with six 3·9-in. quick-firers, on the upper deck, each protected by a steel shield. Two fighting masts, with double tops, approached by double winding stairways within them, and the superstructure (which is much lower than in the *Hoche* and *Magenta*) will carry sixteen 1·85-in. and eighteen 1·45-in. guns. The ship will be protected by two steel belts, the main one rising some 20 in. above the water line, with a maximum thickness of 15½ in., surmounted by a lighter (8 in.) belt, also surrounding the whole ship to a height of some 3 ft., but rising considerably at the bows, and for the protection of the above-water torpedo tubes, which are six in number (there are in addition, four submerged). The ammunition hoists of the great guns are also protected, and the turrets have 15½ in. plating. The main armoured deck, at the level of the top of the heavier belt, is 8½ in. thick, and the splinter-proof deck below takes the form of an armoured protection 1½ in. thick. Between the two decks, as elsewhere throughout the hull, the system of subdivision is given great extension. Like the *Dupuy de Lôme* and *Massena*, the *Charlemagne* and her sister will be propelled by three independent screws, the centre one much further aft than the lateral ones, each driven by a triple-expansion four-cylinder engine in a watertight compartment. The boilers will be on the Belleville system—20 sets in four watertight compartments. The maximum H.P. will be 14,000 with forced draught, giving a speed of 18 knots, but with natural draught the full speed will be 17 knots. The ship will carry coal sufficing for 4,000 miles at 10 knots. The *Gaulois*, now about to be laid down, is of the same type.

**Hull and District Institution of Engineers and Naval Architects.**—On Monday evening, October 21st, the members of the above institution met at the Institute Rooms, Bond Street, to inaugurate the 11th session, and to hear a paper entitled "Enquiries, Tenders, Specifications and Contracts for Steamships and their Machinery," contributed by the President, Mr. F. H. Pearson. The paper, divided into four heads as above, was again subdivided, so as to be more easily treated. *Enquiries*, for instance, being treated under six headings, from the "generally vague" to the "complete enquiry," and all the various classes of enquiries nowadays received by large firms were brought under these heads, and their absurdities or merits pointed out. *Tenders or quotations* treated of the various forms of tenders sent out, and the best forms and clauses now in vogue. *Specifications*.—Here also the general forms were treated of, and one complete in every possible detail was advocated as being the most likely to give satisfaction to all parties. *Contracts*.—Here the formal documents, printed or otherwise, were detailed, and the various clauses best to be inserted in same, and many useful hints given, the whole forming a very valuable and interesting paper. A short discussion followed, at the close of which a hearty vote of thanks was accorded Mr. Pearson for the trouble he had taken in preparing such a lengthy and complete paper.

**The Ship's Course Recording Invention.**—We are informed that the enterprising firm of Messrs. Evan Thomas Ratcliffe & Co., of Cardiff, have submitted this invention to a very severe and protracted trial, lasting more than a year, and finding that better results are to be obtained by its use than without it, have now ordered from the Ship's Course Recorder Syndicate, Limited, 14, Water Street, Liverpool, nineteen instruments, being one for each of their largest steamers. Messrs. Evan Thomas Ratcliffe & Co. say that they found the course recorder very valuable to them recently in a case of collision. This case, to the credit of somebody, was wisely settled out of court on the day appointed for the hearing. Had it gone to trial, the opposite party, with the evidence of the course recorder's ribbon against them, would not have had a leg to stand upon.

**Marine Engineers' Examination.**—At the above examination, held at North Shields on October 8th, 9th and 10th, Mr. B. C. W. Bell, of that town, succeeded in obtaining his certificate as Extra First Class Engineer. He was prepared by Mr. W. H. Thorn, 5, Waterville Terrace, North Shields, and makes the thirtieth successful pupil in that grade from the above establishment.

# NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from September 24th to October 25th, 1895:—

Aborn, G., staff engineer to the *Nile*, to date October 11th.  
 Adams, W. H., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.  
 Adams, W. H., chief engineer to the *Magdala*, to date October 22nd.  
 Amstey, Henry C., assistant engineer to the *Astrea*, to date November 5th.  
 Anderson, W. J., engineer to the *Skipjack*, to date October 11th.  
 Andrews, Harry G., engineer to the *Pembroke*, supernumerary, to date October 10th.  
 Andrews, H. G., engineer to the *Pembroke*, to date October 10th.  
 Aterveen, A., assistant engineer to the *Niger*, to date September 23rd.  
 Atkins, A. E., assistant engineer to the *Vivid*, additional, to date September 23rd.  
 Batchelor, Harry R., engineer to the *Wildfire*, to date October 10th.  
 Bluett, P. W. P., assistant engineer to the *Comus*, to date October 1st.  
 Broadbent, O., engineer to the *Revenge*, to date September 27th.  
 Bryant, Charles W., engineer to the *President*, to date October 22nd.  
 Burner, Alfred, engineer to the *President*, to date October 22nd.  
 Cocks, F. A., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.  
 Cottam, Fred M., chief engineer to the *Champion*, to date October 10th.  
 Cummings, G. R. T., staff engineer, has been placed on the retired list of his rank.  
 Davies, W. R., engineer to the *Vernon*, to date October 11th.  
 Drake, Percy G., assistant engineer to the *Astrea*, to date November 5th.  
 Faulds, A. J., engineer to the *Colossus*, to date September 27th.  
 Finch, James J., inspector of machinery to the *Vivid*, additional, to date October 1st.  
 Gallery, E., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.  
 Gardner, J., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.  
 Gedge, Henry A., engineer to the *Phoenix*, to date September 23rd.  
 Gorfett, G. J., chief engineer to the *Severn*, to date October 11th.  
 Greetham, Charles T. D., engineer to the *Inflexible*, to date October 10th.  
 Haggarty, G. A., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.  
 Harris, R., fleet engineer, has been placed on the retired list of his rank.  
 Hill, C. H., engineer to the *Banshee*, to date September 27th.  
 Hobbs, F. D., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.  
 Lane, James, chief engineer to the *Comus*, to date October 1st.  
 Larg, J. C., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.  
 Littlewood, A. W., engineer to the *Algerine*, to date September 23rd.  
 Manning, Henry L., engineer to the *Fame*, to date October 2nd.  
 Mandling, W. J., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.  
 Melrose, James, inspector of machinery to the *Hibernia*, additional to date October 1st.  
 M'Lamin, J., engineer to the *Vulcan*, to date October 11th.  
 Monkhouse, W., engineer to the *Gossamer*, to date October 11th.  
 Moon, H. J. G., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.  
 Moore, F. J., fleet engineer to the *Victorious*, to date October 11th.  
 Nicholson, G. C., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.  
 O'Neill, John, engineer to the *Pembroke*, additional, to date October 2nd.  
 Pamphlett, W. T., staff engineer to the *Astrea*, to date November 5th.

Parsons, W. G., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.  
 Perkins, G. L. R., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.  
 Pettit, W. J., fleet engineer to the *Agincourt*, to date October 11th.  
 Phillips, R., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.  
 Rabbidge, W., staff engineer, has been placed on the retired list of his rank.  
 Stephens, L. J., engineer to the *Vernon*, additional, to date September 27th.  
 Smith, Henry F. (probationary), assistant engineer to the *Victory*, to date October 10th.  
 Soper, Edward (probationary), assistant engineer to the *Victory*, to date October 10th.  
 Stuart, M., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.  
 Stuttaford, Frank R., engineer to the *Magdala*, to date October 22nd.  
 Taylor, C. G., engineer to the *Quail*, to date September 27th.  
 Tilbrook, O. H., chief engineer to the *Cambrian*, to date October 11th.  
 White, W. W., chief engineer to the *Juno*, to date September 23rd.  
 White, W. W., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.  
 Wishart, W. L., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

## HOAR & BROWN'S HARDWOOD MARKET REPORT, OCTOBER 23rd, 1895.

TRUCK :	Timber Loads.	Planks Loads.	Blocks Loads.	Total Loads.
Stock, 21st Sept.	5,633 ..	2,730 ..	44 ..	8,407
Landings	2,776 ..	172 ..	— ..	2,948
	8,409 ..	2,902 ..	44 ..	11,355
Deliveries	1,381 ..	364 ..	30 ..	1,775
	7,028 ..	2,538 ..	14 ..	9,580

The general log trade has been very quiet indeed, but the outlook is somewhat more encouraging, and a few orders are expected to be placed upon the London market in the near future. The stock has increased during the last month by nearly 1,400 loads, but this surplus will be taken up by the Government selections, which are still being made from these docks. The state of trade, which has undoubtedly improved does not as yet appear to have influenced prices.

PLANKS.—The deliveries are fairly good, being a considerable increase on last month's figures, and arrivals prove to be slightly over those of September. The stock now being 2,538 loads is sufficient to warrant no upward movement in prices, which are likely to remain for some time at the present unremunerative level.

MAHOGANY, HONDURAS AND MEXICAN.—During the last month trade has been brisk, and an entire clearance made of anything approaching prime wood in dealers' hands, so that cargoes coming forward will meet with a good reception and clear market. The low priced parcels which had until lately remained in brokers' hands are mostly sold and an upward movement in this class may be expected daily.

Cuba wood has been going off slowly. The stocks are ample at present, with the exception that there is a scarcity of large logs. It is anticipated that prices will advance rapidly when it is known the insurrection in Cuba is likely to last, and dislocate trade there for some length of time after its subsidence, and judging by the prices now being demanded for the few remaining cargoes, there is no doubt owners have fully made up their minds that no more Cuba will arrive for some years.

In African there is some advance, as shown at the last public sale. All mahoganies are more or less getting low in stock, especially sound sizeable long wood.

ORDAN.—The value of this wood has entirely risen at least 20 per cent., as was witnessed at the public auction last week, when short shaky logs were sold at 4d. per foot. Boat building

logs would command very high prices if here, but at the present moment it is impossible to find anything over 20 ft. in length.

**WALNUT.**—The demand for logs is comparatively weak, considering the light stocks. Prices for small sizes have become a trifle better during the month. In lumber the trade has been good.

**WHITEWOOD.**—Logs are in fair demand at reasonable figures and lumber is commanding more money than of late, especially the first quality brands.

**KAWIA PINE.**—The importations continue, but as usual they are limited in quantity, and prices keep fairly firm.

A firmer tone is decidedly noticeable in most woods, with the exception of teak, which still continues unresponsive to the general revival. Mahogany is expected to take a decided upward movement before many weeks are passed.

## INDUSTRIAL AND TRADE NOTES.

### THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

**TRADE** has been to an extent practically at a standstill in Glasgow and the West of Scotland during the month, owing to the uncertainty as to the issue of the labour disputes; but now that the work of settlement has advanced another stage, the air has brightened, and those who have been keeping back are now showing a disposition to discount a settlement of the points at issue.

An attempt was made to further depress steel and iron prices on the face of the trouble, but producers have not given way as they all along took up the position that any strike or lock-out could only be sectional. The Scotch steel-makers have a lot of work on hand for England and foreign account, hence the uneasiness with regard to this branch of industry was more imaginary than real. Prices have remained firm and the output large. Clyde shipbuilders were invited during the month to tender for three first-class cruisers for the British Admiralty and for the construction of a belted cruiser for the Chilean Government. The Japanese and Chinese Governments were also forward with invitations to offer for warships. With a strike hanging over their heads, however, Clyde builders are slow to tender, but once the present difficulty is settled, the necessary schedules will be at once filled up.

After a four weeks' strike, work was resumed at the Clyde-bridge Steel Works on Monday, the 7th ult., and night and day shifts have since been in full swing. The strikers have resumed work on the old conditions, but all the men could not be taken back, their places having been filled with new hands. This is a most unfortunate result for the misguided men who entered on the struggle regardless of consequences. The company's books are well filled with orders and specifications are plentiful.

Five firms on the Clyde have been asked to tender for the construction of the new cruisers for the British Navy. These are:—Messrs. Thomson, Clydebank; the Fairfield Co., Govan; the London and Glasgow Co., Govan; Messrs. Napier & Sons, Govan, and Messrs. Scott, of Greenock. In addition, there are the Naval Construction and Armaments Co., Barrow; Messrs. Harland & Wolff, Belfast; Messrs. Laird, Birkenhead; the Thames Iron Works Co., London; the Earle Co., of Hull; Messrs. Palmers, of Jarrow, and Lord Armstrong's firm, at Elswick. These are probably sufficient for competition, and even then the matter of competency to undertake the work may have to be eventually considered. As mentioned in last month's Notes, the vessels are classed between the *Blenheim* and the *Terrible*, the length being 435 ft.; beam, 69 ft., and displacement, 11,000 I.H.P., being little short of the latter vessel in size or power. Belleville water-tube boilers are specified and it has now been practically settled that no firm will get more than one vessel to build.

Messrs. Kelso & Co., the well-known model makers of Glasgow, have just completed a unique specimen of their art deserving special mention. This is a miniature representation of the screw steamer *Ruahine*, one of the New Zealand Shipping Co.'s fleet, built by William Denny Bros., Dumbarton, about four years ago. Instead of the plain exterior of the hull ordinarily shown by ship models, the one in question consists of half the ship, represented as cut through the centre line from stern to

stern, and from keel to masthead, exhibiting in section all the items which go to make up the hull, hull structure and outfit. It is constructed entirely of brass, and has been built up piece by piece, exactly as in the case of a full-sized ship, the work having occupied twelve months, considerably more than was required for the completion of the original vessel. The number of separate pieces going towards the completed structure number many thousands, and while, as was only possible on such a small scale, the binding medium employed has been solder, and not rivets, as in the real vessel, each and every rivet is clearly and faithfully represented. This attention to such minutiae as rivet-heads will convey an idea of the fidelity and exactitude with which all the other work has been produced, such as frames, reverse frames, floors, pillars, beams, bulkheads, deck planks, deck fittings, etc., etc. This fine example of the model-maker's art—measuring 14 ft. by 1 ft. 6 in. deep—is intended for educational purposes on board the training ship *Worcester*, of the Thames Nautical Training College, lying off Greenwich.

Mr. Andrew Laing, who has for many years been chief of the engine department, will shortly sever his connection with the Fairfield Engineering and Shipbuilding Co., Limited, Govan. Mr. Laing joined the staff so far back as 1877, and from the office of draughtsman, which he then filled, worked his way to the responsible position he is about to relinquish, which is perhaps one of the most coveted in the engineering world. Four years later he was appointed chief draughtsman, and from that time forward was practically responsible for all the machinery produced. In 1885 the assistant managership was added to his existing duties; two years later the direction of the whole engine department was placed in his hands, and subsequently he was appointed a director of the company. His achievements are not by any means the least in the record of the great concern which the late Sir William Pearce built up, his experience covering perhaps the most eventful period in the history of the marine engine. Previously, his share in the development of the fast ocean steamship had not been inconsiderable, but the period which succeeded his accession to power was riper for innovation, and the reputation of the Fairfield Co. for progress was fully maintained by him. His first notable success in high-speed steamers was the Hamburg American Liner *Normania*, but subsequently he secured for Fairfield and the Clyde the blue-ribbon of the Atlantic with the *Lucania* and *Campania*. During Mr. Laing's stay many important changes were effected in the department he controlled. The engine shop was extended and re-organised, and the boiler shop rebuilt under his directions. To his experience as a millwright, which he originally was, is largely due the facilitation of labour to be found in the new and renewed premises and at the tidal dock. The latest work achieved by Mr. Laing is the paddle boats for the Queenborough and Flushing route. As in the case of the *Tantallon Castle*—the machinery of which he designed—the machinery marks an advance on existing practice, for the engines are of the triple-expansion type and of a power decidedly uncommon. The immensity of the task involved may be gauged by the fact that over 10,000 H.P. has been developed by the machinery of these boats when tried on the Clyde. In Admiralty work Mr. Laing has been, if anything, more successful than ever, the *Handy*, the first of the three torpedo-boats, the engines of which he designed, doing 29·8 knots on her official trials. Mr. Laing's successor has not yet been appointed.

Mr. D. F. Black, a shipbuilder well known on the Clyde—until a month or two ago manager at the Elswick works—has laid before the Admiralty some suggestions as to the modifications in the design of battleships and cruisers. The idea is to afford additional protection against shot or ramming, and the principal feature is the removal of the coal bunkers from the wings of the ships, where they usually are in warships of all nationalities. Instead of the bunkers, Mr. Black would have a cofferdam immediately inside the outer skin of the ship, with a longitudinal bulkhead of considerable thickness, the protective deck being curved down some 8 ft. or so, forming the bottom of the cofferdam. Between the bulkhead of this cofferdam and the curved protective deck would be a large space filled with large steel hollow balls. The idea in using the latter is to lessen the quantity and weight of water in the event of the cofferdam being smashed. Thus, from 7 ft. to 14 ft. on either side of the ship is taken up. The bunkers are over the protective deck, removed 8 ft. or 10 ft. from the outer skin



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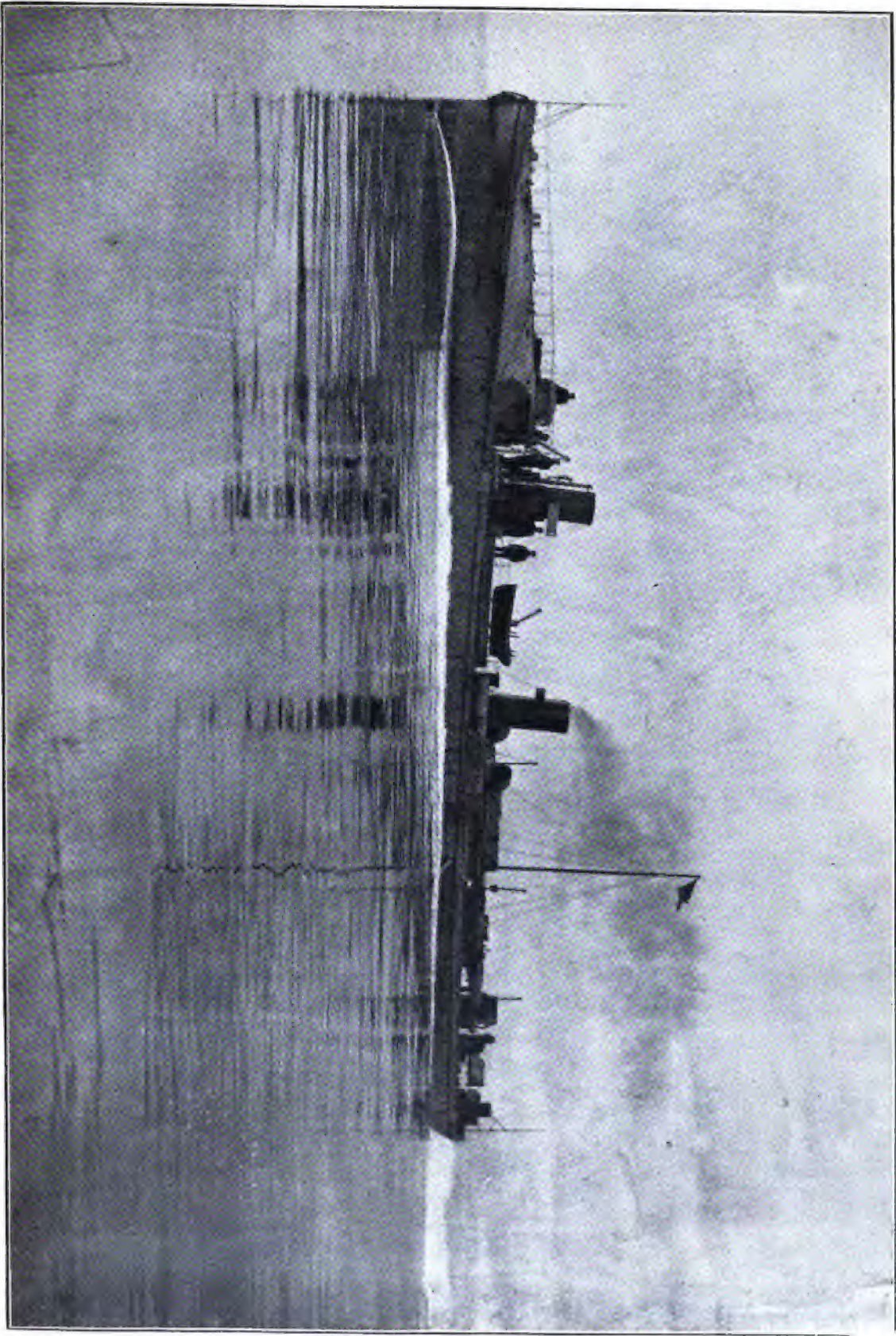
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THE TORPEDO BOAT DESTROYER "SOKOL," BUILT AND ENGINEED BY MESSRS. YARROW AND CO., POPLAR, FOR THE IMPERIAL RUSSIAN GOVERNMENT.



[NOVEMBER 1, 1895



TORPEDO BOAT FOR HER MAJESTY'S GOVERNMENT, BUILT BY MR. J. SAMUEL WHITE, EAST COWES.

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and protected by the double thick plates. The only objection to bunkers is the possibility of spontaneous combustion from shot, and the fact that doors are needed for the supply of coal. But these are small compared with the advantage of moderate protection without increase in weight. The Admiralty, however, it is believed, will not adopt the suggestions, and although no reason is ever given for the attitude taken by the technical staff at the Admiralty in such cases, one can make the shrewd guess that the space and weight monopolised are alone sufficient. An increase of 15 per cent. to a 15,000-ton ship can only be justified by very material advantages.

A novel apparatus has been fitted on board the Clyde-built steamer *Calais Douvres*, owned by the London, Chatham and Dover Co., by which a flash of electric light is sent vertically into the air. The idea is, that as fog always hangs low, the electric light will penetrate through it and prove valuable for signalling purposes.

Messrs. Robert Napier & Sons, engineers and shipbuilders, Govan, received, during the month, an order to build three steamers of between 4,000 and 5,000 tons each for the Royal Mail Steamship Co. The vessels are to be fitted with all the latest improvements, and are to ply between Southampton and South America. Messrs. Napier are pretty well supplied with work, and in addition to the above secured early in the month a repeat order of one of the boats at present on the stocks.

Messrs. Charles Connell & Co., Scotstoun, contracted late in the month to build a spar-deck cargo steamer, about 400 ft. long, and of about 4,000 tons, for German owners. The vessel will be fitted with triple-expansion engines, and will be supplied by Messrs. D. Rowan & Son.

Messrs. Alex. Stephen & Sons, Linthouse, secured an order towards the beginning of the month, to construct two vessels of about 5,000 tons for the Clan Line. Three vessels in all are being constructed, the other vessel having been placed with the Naval Construction and Armaments Co., Barrow.

The statement has been published in the English newspapers that Messrs. Thomson, of Clydebank, have had difficulties with the tubes of the Belleville boilers now being constructed by them for the cruiser *Terrible*, and that in consequence a chief engineer had been sent to Clydebank from Messrs. Maudsley's. I have made enquiries and find that there is no truth whatever in the story. No difficulty has been experienced with the tubes. On the contrary, the work has gone forward so satisfactorily that a representative from Belleville's works in Paris has been sent to Clydebank to study the conditions under which the work has been so expeditiously done. Two of the boilers have been subjected to a series of evaporative tests with most satisfactory results, everything working efficiently. No trouble whatever was involved. The Admiralty authorities themselves recognise the perfect workmanship and the efficient manner in which everything has so far turned out. During the month Messrs. Thomson received an order from the Admiralty to supply the torpedo gunboat *Surly* with a new port low-pressure cylinder and accessories. The *Surly*, which was built by Messrs. Thomson, met with an accident to her machinery during the manoeuvres, necessitating a renewal of the portion mentioned.

Messrs. Napier, Shanks & Bell, Shipbuilders, Yoker, during the month laid the keel of a small-sized warship for the Government of San Domingo (West Indies).

It was rumoured during the month that the North-German Lloyd's Co. had placed with a Govan firm of shipbuilders, an order for two steamers whose dimensions will exceed that of *Campania* and *Lucania*. This order, if actually received, will give great satisfaction to Clyde builders, as of late the German Co. has had its ships built in native yards.

Messrs. William Denny & Bros., engineers and shipbuilders, Dumbarton, received an order in the early part of the month to replace the steamer *Seaford*, which it will be remembered was run down and lost in the English Channel, for the Brighton and South Coast Railway Co. The same firm also booked an order during the month to build a fast paddle-steamer as an addition to the fleet of the London, Woolwich and Olacton-on-Sea Steamboat Co., for whom they have already built several vessels. Messrs. Denny have at present on hand other four vessels, one for the Russian Volunteer Fleet, one for the Russian Steam Navigation Co., and two for the London, Chatham and Dover Railway cross-channel service. Messrs. Denny also secured, during the month, the contract to build five boilers for a large new passenger steamer which the Austrian Lloyd Steamship Co. intend

building at Trieste. The material for the hull was placed in this country some time ago. This company intends placing orders abroad for several other new steamers, but nothing definite will be settled until next month.

Messrs. Matthew Paul & Co., engineers, Dumbarton, secured the contract to make the ventilating fans and machinery for the first-class battleship *Hannibal*, at present being constructed at Pembroke.

Messrs. Fleming & Ferguson, Paisley, during the month shipped to South Africa two sets of patent triangular connecting-rod compound engines of 600 I.H.P. Engines of 400 H.P. for a foreign gunboat were completed by Messrs. Lobnitz & Co., Renfrew, towards the beginning of the month. Messrs. Ross & Duncan, Govan, completed the following:—Compound surface-condensing engines of 350 I.H.P. for the trawler *Seamen*; compound surface-condensing engines of 275 I.H.P. for the Imperial Russian Embassy; triple-expansion engines of 850 I.H.P. and launch engines of 50 I.H.P. for shipment abroad, and compound surface-condensing engines for the s.s. *Norman*.

Messrs. Bow MacLachlan & Co., engineers and shipbuilders, Paisley, still continue to receive substantial recognition of their past efforts, and are at present in receipt of several noteworthy orders. The efficient manner in which this firm has turned out steering machinery in the past has merited further confidence. During the month they have been busily engaged constructing steering engines to the order of the Admiralty. These engines are intended for vessels recently completed or in course of construction, amongst which are the following:—H.M.S. *Gladiator*, engined by Messrs. Maudsley, and the torpedo-boat destroyers *Quail*, *Sparrow-hawk*, *Thrasher* and *Virago*. In the shipbuilding department, however, they are but indifferently supplied with work, having only at present two steel light-draught paddle steamers of no great size.

Messrs. Rankin & Blackmore, Eagle Foundry, Greenock, contracted about mid-month to supply the triple-expansion engines of about 800 H.P. for a steamer, the contract for the hull of which was placed with the Campbelltown Shipbuilding Co.

Messrs. Anderson, Rodger & Co., Port-Glasgow, have laid the keels of two first-class sailing ships, each of 3,300 tons carrying capacity, to the order of Messrs. Gordon, Cowan & Co., shipowners, Greenock. The vessels are for the general carrying trade, and will be fitted with all the latest improvements. Messrs. Rodger also contracted during the month to build a twin-screw saloon steamer for passenger service on the river Amazon. This steamer will be 120 ft. in length, by 22 ft. beam, and will be capable of carrying 400 passengers. The machinery, which will be supplied by Messrs. Rankin & Blackmore, Greenock, will be of the triple-expansion type.

Messrs. Kincaid & Co., engineers, Clyde Foundry, Greenock, booked an order about mid-month to build and engine a stern wheel steamer of 100 ft. in length, for service on the American Lakes.

Messrs. Scott & Co., Greenock, have laid the keel of a sailing vessel of 2,600 tons gross, and 800 ft. in length in their yard, to the order of Messrs. Adam Hamilton & Co., 1, Cathcart Street, Greenock.

Messrs. David J. Dunlop & Co., Inch Works, Port-Glasgow, contracted about mid-month to build and engine a steel twin-screw steamer to trade on the West Coast of Africa. The dimensions will be:—Length, 204 ft.; breadth, 35 ft.; depth, 13 ft. The steamer, which will be similar to one constructed by Messrs. Dunlop three years ago, will be supplied by them with boilers and triple-expansion engines. Messrs. Dunlop also received instructions during the month from the New Zealand Government to construct a new steamer to be employed in cable and lighthouse work. The vessel will cost £30,000, and is to be completed within six months.

Messrs. Paul, Jones & Son, yacht-builders, Gourcock, secured an order towards the early part of the month to build fifteen small sailing yachts, for members of the Innellan Yacht Club. The yachts will all be of similar design and will each be 17 ft. in length, with 5 ft. beam, and 3 ft. draught. They will have 6 cwt. of lead on keel, and will carry 200 square feet of canvas. The designers are Messrs. J. & M. Paterson, Greenock.

Mr. James Adam, yacht and boat builder, Cove Yard, Gourcock, contracted about mid-month to build a twin-screw steam launch for Mr. William White, engineer, Greenock. The vessel will be fitted with two sets of compound surface-condensing engines having 4½ in. and 9 in. cylinder with 6 in. stroke.

Messrs. The Ailsa Shipbuilding Co., Troon, about the begin-



ning of the month received instructions from Messrs. Tedcastle, of Dublin, to construct a passenger and cargo steamer of large tonnage. This, with work on hand and other orders recently secured, should keep the yard fairly well employed during the coming winter.

There are no less than 18 large vessels at present lying up in the Gareloch, amounting to several thousand tons register. Many of the vessels have been lying there for years, and form a sad sequel to the rapid development of speed and capacity in modern steamboats. During the month one or two enquiries have been made with a view to purchase, but in no case has a settlement been made. The following are a few of the largest vessels:—Allan Line, *Manitoba*, *Nestorian*, *State of Alabama*, and *Caspian*; Anchor Line—*Circassia*, *Caledonia*, *Devonia* and the ill-fated *Utopia*; Guion Line—*Arizona* and *Alaska*.

## TRADE NOTES FROM THE TYNE, WEAR TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

### THE TYNE.

**Shipbuilding.**—In spite of the fact that prophecies of an early revival of trade are being made on all sides, and that recently published official statistics seem to afford some ground for the optimist views expressed, the absence of any special animation in the shipbuilding trade of this district is still noticeable. The principal yards, it is right to say, continue to be well supplied with work, but in several establishments empty berths are to be noted, and some few continue to be absolutely without work, in progress or in preparation. On the strength of their reputations and their superior productive facilities, a large proportion of Tyneside shipbuilding firms have been able to secure a satisfactory share of such work as was in the market during the present year, and considering the keen competition of other districts, this is a matter upon which they may well be congratulated. Still, the fact remains that the period of general activity and full employment for labour, has not yet arrived, and its advent is now likely to be postponed till the winter months are past.

The requirements of the Elswick yard continue to absorb a great part of the idle labour from the mid-Tyne district, and it is satisfactory to know that the briskness at this great establishment is more likely to be increased than diminished, as additional orders have been booked. Two vessels—a cruiser and a battleship—are to be launched early next year, and it is understood that the keels for other vessels will be put down as soon afterwards as practicable. A petroleum steamer—said to be the largest vessel of this class afloat—was launched from the Low Walker yard of Messrs. Armstrong, Mitchell & Co., on the 17th inst. The vessel, which is built to the order of Messrs. Samuel & Co., London, is intended for the Eastern trade, and is adapted for alternating cargoes of silk, tea, and general goods, with oil cargoes. This, we believe, is quite a new feature in oil ships, and the vessel has had to be fitted with an equipment of the newest and most effective ventilating plant to permit of this arrangement. There remain on the stocks, a couple of other large vessels, and in the initiatory departments some activity exists.

Messrs. Wigham Richardson & Co. have a good deal of foreign ordered work—mostly of a high class—in progress, and their establishment is every day showing a nearer approach to the normal state of briskness. At Messrs. C. S. Swan & Hunter's yard, the activity noted on several occasions previously this year, is fully maintained, and the keel for another large vessel has just been put down. We hear that the electrical hoisting apparatus that have recently been erected at this establishment, in connection with the new building shed, has proved of immense utility in facilitating work. Messrs. Wm. Dobson & Co., have three vessels of various sizes on the stocks, and have it is understood, booked one or two additional orders. Frame bending for a vessel of moderate dimensions has been commenced at Messrs. Wood & Skinner's yard, and work in the outside departments will soon be considerably stimulated.

An event of more than ordinary importance took place at Hebburn, on the 19th inst., this being the launching of the splendid Russian volunteer boat *Kherson*, from the yard of

Messrs. Hawthorn, Lealie & Co. The vessel, which is nearly 500 ft. in length, is fitted with duplicate engines to drive her at a speed of over 19 knots per hour, and is in all respects most admirably equipped. This is, probably, the most important launch that has taken place on the Tyne this year. The Palmer Co. have recently booked orders for two good-sized vessels, and hopes are entertained that these will shortly be supplemented by an order for one or more vessels from the Admiralty.

The Tyne Shipbuilding Co. have their building berths fully occupied, and as the frame-bending department is still kept busy, the indications of continued good trade at this establishment are very favourable. Messrs. Readhead's yard also presents an appearance of very general activity, the repairing department being quite as busy as the shipyard. The smaller shipbuilding yards at North and South Shields are not particularly busy, but at most of the repairing establishments there is a sufficiency of work in hand to keep the usual complements of operatives in employment. At this season of the year there is usually an increase of work at the graving docks, and the customary improvement is now beginning to be felt.

**Engineering.**—At the St. Peter's works of Messrs. Hawthorn, Lealie & Co., business is still active, a large part of the machinery being kept running night and day. The large Russian steamer *Kherson* is now at the sheerlegs receiving her machinery. The North-Eastern Marine Engineering Co. are engaging, at their Wallsend works, the fine steamer *Phryne*, built by Messrs. C. S. Swan & Hunter, for a firm of French owners. At the Wallsend Slipway Engine Works the large oil steamer *Nerite* is being fitted with her machinery, and there is a large amount of other work in hand. The Neptune Engine Works are fairly busy, and the same may be said with reference to Messrs. Readhead's and also to the Palmer Co.'s works.

Messrs. John Abbot & Co. have been very busy for some time past with hydraulic work for Southampton. In their ironfounding department there is considerable activity, there being large contracts in hand in marine work, besides columns, &c., for new buildings in course of erection, by the North-Eastern Railway Co. The firm's rolling mills are just now in full swing, and in the chain and anchor departments business shows an improving tendency.

Messrs. Noble & Lund, of the Northern Machine Tool Works, Felling, are putting down additional plant with a view to increase productive capacity. This step has become necessary through an increased demand for their specialities, especially for the piston rings (Mudd's patent) of which they are the sole manufacturers.

Messrs. Carrick & Wardale, Bedheugh Engine Works, have just completed an equipment of hydraulic cranes and capstans for a new goods station at Gateshead. The cranes, &c., are similar in design to those manufactured by the same firm, some two years ago, for the equipment of the large goods station at Forth Banks, Newcastle. The firm have also recently supplied to a Northumberland Colliery a set of powerful pumping engines, and have now some similar contracts in progress. They are also having a sustained demand for their well-known bilge pumps &c. At Messrs. Black, Hawthorn, & Co.'s Works enquiries have been more numerous lately, and though no great amount of business has as yet resulted, it is hoped that some of the departments will soon be well employed.

Mr. George Noble (late George Noble & Co.), agent for Messrs. Charles Cammel & Co., Messrs. Stone & Co., the Mirrlees, Watson, & Yaryan Co., Limited, &c., is about to remove to extensive offices in Dean Street. The Blake & Knowles Steam Pump Manufacturing Co., whose London office is at 117, Queen Victoria Street, E.C., have appointed Messrs. J. Isdale & Co., of 63, Quayside, their agents for the district comprising the Tyne, Wear, and Tees. This company manufacture pumps and pumping engines of all sizes and types, and claim to have a larger number of their special design and make in actual work than any other firm engaged in this special line of work.

Since the establishment of a branch of their business at 82, Side, Newcastle, Messrs. Higginson & Co., of Liverpool, have experienced a largely increased demand for their specialities in this district. The wrought steel blocks and sheaves which have been patented by this firm, and which they are manufacturing in daily increasing quantities, have rapidly come into favour, and are now being specified for numbers of new ships. These blocks are both lighter and stronger than ordinary wood blocks and can be supplied at a much lower cost.

The sales of Magnolia metal by the local agents—Messrs. Robert Bowran & Co., 8, St. Nicholas Buildings—have been unprecedentedly large this month, and there can be no doubt that the popularity of the speciality is increasing. This result has doubtless been helped by the circumstance that the locomotive engines belonging to the North-Eastern Railway Co., which were employed in the much-talked-of railway race between London and the North of Scotland, and which did their work so admirably, had Magnolia metal in the bearings.

**Blyth.**—The Blyth Shipbuilding Co., Limited, have two vessels on the stocks, one of which is nearly ready for launching. In the company's graving docks there are two large vessels undergoing repairs. The coal trade of the port is at present quiet, the collieries in the vicinity not being in full work. Active progress is being made with the construction of the new coal staith at North Blyth, and it is expected they will be completed early next year.

#### THE WEAR.

**Shipbuilding.**—The Sunderland Shipbuilding Co. have received from Messrs. William Lund & Co., London, an order for a 6,000 ton steamer, to be employed in the Australian trade. The company have previously built three vessels for Messrs. Lund, the last of which—the s.s. *Warrigal*—was launched in 1893. Messrs. J. L. Thompson & Sons are still very busy, the whole of the berths being occupied, and the frame-bending department being kept in steady operation.

The plating of the big cargo boat at Messrs. Doxford's is being actively proceeded with, and unless very bad weather comes to stop outside work for prolonged periods, the vessel will be ready for launching early next year. There are also two large "turret" ships in progress, and it is understood that others are in preparation.

Since last month an increase of work has taken place at Messrs. Short Brothers' yard, and the frame furnaces are now in busy operation. Only a limited amount of repair work is being done in the port just at present.

**Engineering.**—At the Palmer's Hill works, business has not been as brisk as could be wished lately, but there is now more doing in the pattern shops, and this furnishes ground for the expectation that an improvement will be felt in the other departments soon. There continues to be a steady demand for Dickinson's patent crank shaft, the manufacture of which speciality is a material help to the general work of the establishment.

At the Scotia Engine Works, signs of improving business are apparent, and at the North-Eastern Engine Works, South Dock, the state of trade, which has been relatively good throughout the year, continues satisfactory.

A newly-constituted firm under the title of William Rockliffe & Co., have commenced business at Folly Bank, Hedworth Street, Monkwearmouth, as manufacturers of Rockliffe & Jobling's patent casing doors for ships' galleys, alleyways, &c., and have already received commissions from shipbuilders in the locality. These doors are supplied with the necessary attachments complete, and quite ready for placing in position at a price much below the cost of the ordinary doors manufactured in the shipyards. The patent door has an extended overlapping flange, which forms the medium by which it is fastened to the plate, and also affords a covering for the rough edge which is left after the doorway space is formed by punching or cutting. The frame is fixed to the plate with countersunk bolts, thus avoiding riveting and the consequent risk of breakage. As Messrs. Rockliffe & Co. propose to supply a better article than is now generally in use at a considerably lower cost, there seems reason to expect that firms who want to economize—and who does not in these keen days of competition?—will give their speciality a trial.

Mr. E. J. Smith, of the Pier Engine Works, has had several good ship repair contracts lately, and is still kept pretty busy in that special line. The works are most conveniently situated at the entrance to the South Dock, and are fitted up with all the necessary plant for carrying out repairs to either the hulls or engines of vessels.

**The Hartlepoons.**—The shipbuilding yards at this centre continue to be fairly active, and it is understood that some new orders have been placed. Since August, the following vessels, for which the engines and boilers were constructed at the

Central Marine Engineering Works, have been fitted and steamed at the sheerlegs:—The *Aries*, the *Kirkstall*, the *Saint Ronald*, and the *Maria Elsie*. The two former, and also the s.s. *Pectan*, have since then had their trial trips. The s.s. *Pectan* is an exceptionally fine vessel, built by Messrs. Wm. Gray & Co., to the order of Messrs. Samuel & Co., of London, and intended for the bulk petroleum trade. She is the largest bulk oil steamer afloat, takes Lloyd's highest class, and is of the following dimensions:—Length, 888 ft.; breadth, 48 ft.; and depth, 31 ft. 6 in. The engines, which with the boilers are placed aft, are of the well-known triple-expansion type manufactured at the Central Marine Works, the cylinders being 27½ in., 43½ in., and 78 in., by 48 in. stroke. The boilers, three in number, are single-ended, but of large size, and are constructed to work at a pressure of 160 lbs. per square inch. The trial trip was in all respects a satisfactory one, the average speed attained being 11 knots, while everything worked in the most perfect manner, with absolutely no heating of bearings, and no necessity for the application of water. It may also be stated that the boilers and all steam joints were perfectly steam tight. In the designing and construction of this vessel, and another which is now being fitted out at the same works, great pains have been taken to ensure the best results, and experts have pronounced the vessels to be a distinct advance upon those which were previously built for employment in this special trade. Not only in all matters of detail is the superiority apparent, but also in the arrangements for safe carrying and rapid loading and discharging of bulk oil cargoes. The *Aries* is a sister ship to the *Argo*, mentioned in our September report. The vessel has been built by Messrs. Wm. Gray & Co., for Messrs. Rickinson Sons & Co., of West Hartlepool. Both these vessels are of a special shallow draught type, the designs for which have received much attention in the shipbuilding department during the past couple of years, with the result that there is now a considerable demand for repetitions. The engines of the *Aries*, like those of the *Argo*, are triple-expansion, the cylinders being 24 in., 38 in., and 64 in. by 42 in. stroke. The boilers, which are exceptionally large, are constructed to work at a pressure of 160 lbs. The vessel made her trial trip in the light state, having only her bunker coals and ballast water on board. The machinery ran entirely without hitch or trouble, and without the necessity of applying water to the bearings. The handiness of the machinery in its ready response to the orders of the engine room telegraph from the bridge, was particularly noticeable, and it may be observed in passing that this is a feature which cannot be too highly estimated, especially in large steamers that have to navigate narrow channels and rivers. On the termination of the trial, the vessel proceeded to Blyth to load, making a speed of 11½ knots along the coast, on this, her first journey. The s.s. *Kirkstall* has been built by Messrs. Wm. Gray & Co., to the order of Mr. Stephen W. Furness, of West Hartlepool. Her engines are triple-expansion, with cylinders 19 in., 30½ in., and 51 in. by 36 in. stroke. In entering upon her trial, the vessel left the docks at an early hour, and had the compasses adjusted, after which a party of the owner's friends proceeded on board, and a successful run was made as far as Seaham Harbour and back, the engines working with perfect smoothness, and giving complete satisfaction to all. The s.s. *Saint Ronald* was built by Messrs. Wm. Gray & Co. for Messrs. Rankin, Gilmour & Co., of Liverpool. Her engines, which are of 1,200 H.P., have just been fitted, and satisfactorily steamed. The s.s. *Maria Elsie* has also had her engines (which are to develop 1,100 H.P.) fitted. The vessel was built by Messrs. Wm. Gray & Co., for Messrs. Rodocanachi, Sons & Co., of London.

**Stockton.**—After a period of slackness, Messrs. Craig, Taylor & Co.'s yard is again showing signs of coming activity. Frame bending has been commenced, and arrangements for laying the keels of two or three vessels are being made. At the other yards business continues fairly brisk. Engineering works are moderately busy, and some of the boiler-making establishments are having as much work as they can deal with. At the Stockton Forge there are some good contracts in hand, and local rolling mills are making better time.

**Middlesbrough.**—At Sir Raylton Dixon & Co.'s yard there is a fair amount of work on the stocks, and the firm are also busy with repair work. The s.s. *Junna*, a large vessel belonging to the British India Steam Navigation Co., is being extensively altered by the firm, with a view to fit her for employment in the Australian or New Zealand dead meat trade. The vessel has

been employed as a passenger ship, and also as a troopship, and having an exceptionally large amount of 'tween-deck space, she will, no doubt, when the alterations are completed, prove admirably adapted to the new service contemplated.

An Industrial and Engineering Exhibition has been opened in the Corporation Buildings with great success. The Mayor of Middlesbrough officiated on the occasion, and a large number of the principal inhabitants were present. The exhibition is under the management of Mr. H. Engel, who so successfully managed previous exhibitions in Sunderland and Newcastle.

**Darlington.**—The Darlington Forge Co.'s works are kept going day and night, which circumstance is, of course, indicative of a full state of the order-book. The company have been successful in obtaining a good share of the orders for ship and engine forgings lately in the market, and these, it may be added, have been very considerable. The finished crank shafts and straight shafts for H.M.S. *Dido* and *Isis* are just now being delivered. The company are at present engaged upon overhead forgings for H.M.S. *Jupiter*, building on the Clyde, and for a Japanese battleship building on the Tyne. They have also an important order for shafting for three new steamers that are being built to the order of the Royal Mail Steam Packet Co., besides orders for a number of large cast-steel stern frames and rudders for ships being built by the Flensburg Shipbuilding Co., Germany, and others.

### THE MERSEY.

(From our own Correspondent.)

**DURING** the past month the dispute in the shipbuilding industries on the Clyde and at Belfast has necessarily tended to produce an unsettled feeling in this district, which has for the time being given a check to operations of any weight, especially in raw material, as the possibility of a strike of such large dimensions as that threatened in the shipbuilding industry would necessarily considerably influence prices. Consumers consequently have preferred to go on with the iron they have had to come in before placing further orders, but the position, taking it all through, remains strong, and the outlook for the future is regarded with confidence. The position as regards the marine engineering and shipbuilding industry on the Mersey remains much as reported last month, the activity which has recently set in being still confined to the Birkenhead side, the marine engineering and shipbuilding trades on the Liverpool side remaining in the same unsatisfactory condition as previously noted.

On the Birkenhead side of the Mersey, Messrs. Laird Brothers continue well employed, and during the month two of the torpedo-boat destroyers on order from the Government have been sent afloat, these vessels being the *Quail* and the *Sparrowhawk*. The *Quail* was launched in 88 days after the laying of her keel, and was placed in one of the graving docks to receive her machinery and be fully completed, whilst the *Sparrowhawk* was sent afloat from Messrs. Laird's works within 100 days from the laying of the keel. These two vessels are the largest, most complete, and perhaps the most powerful boats of their class yet built, and will carry coal enough to steam at moderate speed to the Mediterranean, or even, if needs be, to cross the Atlantic. I may add that rapid progress is also being made with the other 30-knot destroyers ordered in May last, and the keel of one of the accelerated Irish Mail Service boats lies alongside. The London and North-Western Co.'s steamer *Violet* has also been fitted with improved paddle wheels and other fittings just complete.

In the general engineering trades a continued steady improvement is reported, and most branches are now getting well supplied with work, whilst better prices are obtainable on new orders coming forward. Machine tool makers are securing a good deal of new work both on home and foreign accounts, and establishments, as a rule, are now well engaged with an encouraging outlook for the immediate future. Boiler-makers are in most cases well employed; stationary engine builders continue in a good position as regards work in hand, whilst locomotive builders have recently been securing a moderate amount of new orders, and look forward to a substantial improvement in trade. Amongst cotton machinists, a good many orders for abroad have been booked, and in some cases, establishments have work in hand sufficient to keep them employed for a considerable time forward.

The returns issued by the engineering trades unions indicate a slight improvement in trade, which is evidenced by a corresponding decrease in the number of out-of-work members on the books of the societies. The Amalgamated Society of Engineers has now only about 4½ per cent. of the total membership on the books for out-of-work support, whilst in this immediate district there are about five per cent. of the local membership on unemployed benefit, the returns for this locality having remained stationary for the last two or three months. In the Steam Engine Makers' Society, the returns show about 2½ per cent. on donation benefit, which is practically the same as last month. As to the state of trade, a slow but sure improvement is reported, and although it has not been so marked as during previous months, this is regarded as only a temporary check to the advent of a better condition of the engineering industries.

An apparatus which will be found very useful for engineers on board steamships, &c., is being brought out by Messrs. Tong & Wood, Chapel Walks, Manchester. This invention is a patent oil-purifier, the "Simplex," which has been specially designed for purifying, and thus rendering fit for further use, the oil which drips from shaftings, engines, &c., which is usually wasted. The purifier consists of a cylindrical apparatus, containing a number of sieves and spreaders. The oil is first caught in a bucket, and then poured into a receiver at the top of the apparatus, whence it falls through a sieve on to a second sieve underneath, which acts as a spreader for working the oil into a pliable condition. After its passage through the spreader, the oil falls into a syphon, out of which when full, the oil flows, leaving all sediment at the bottom. The oil then falls through another sieve and spreader, after which it is passed through a second syphon arrangement, and the oil is then filtered through a prepared flannel arrangement. These sieving arrangements are repeated, according to the degree of purification required, and the lowest portion of the cylinder is so constructed that any water, &c., that may have got into the oil falls to the bottom, the oil itself floating at the top, and two taps are provided, one to run out the oil from the upper portion of the lower end of the purifier, and the other below this, to run out the water. Five air-vents are provided at the top of the purifier. Amongst the advantages of this purifier are that it is direct, complete, and self-contained, and the dirty oil is rendered absolutely pure and perfectly safe for repeated use, thus frequently effecting a saving of at least 75 per cent. The purifier is made in various sizes, ranging from 42 in. by 18 in., for filtering 28 gallons per day, with copper steam appliances for very thick oil, down to 24 in. by 10 in. to filter five gallons per day for light oil, and the most satisfactory results have been obtained where they have been adopted.

Mr. J. K. Broadbent, of Islington Square, Salford, Manchester, has designed a very effective smoke-preventing apparatus for application to large boilers. This invention, which has been named Broadbent's patent alternate and automatic side-firing and smoke-preventing apparatus, is so constructed that when the furnace-door is opened to fire up one side of the furnace it raises an air-door, which admits a current of air down the back of the doors and over the fire, and with this door opened he can fire well up one side of the furnace, and when it is closed again it is bolted, and remains so until the air door is let down, when it is released, and the man can fire the other half of the furnace in a similar manner by opening another door, so that the temperature of the furnace is kept up, and the bright fire on one side of the furnace helps to burn the smoke from the other. This system of firing obviously presents many advantageous features, as besides preventing the incandescent fuel on the bars from running too low, the fires are better kept up the sides of the furnaces, whilst there is less consumption of coal and a great increase in the evaporating power of the boiler.

In the iron trade there has been rather a falling off as regards the weight of business doing, owing largely to the fluctuations in the warrant market, and to consumers being mostly well bought for current requirements. Makers, however, are also well booked for some time forward, and, being indifferent about further business just at present, are, as a rule holding firmly to late rates, and in some cases quoting further advances. The only weakness in prices is in outside brands that are directly affected by the warrant fluctuations, with some underselling in iron held in secondhands. Local pig-iron makers are not now quoting under 46s. less 2½ for foundry qualities, delivered Manchester, and in district brands an advance of 6d. per ton upon recent rates has been put in force. Lincolnshire now averaging 41s. 6d. for forge to 43s. 6d. and 44s.

for foundry, net cash, as the minimum, with Derbyshire foundry quoted 46s. 6d. to 47s. 6d. net cash, delivered Manchester. As regards outside brands offering here, some makers still hold to 47s. 10d. net cash, for good foundry Middlesbrough, but 47s. 8d. to 47s. 6d. are about the average figures for delivery Manchester, with Scotch iron obtainable at 49s. for Eglinton, and 49s. 6d. for Glengarnock, net prompt cash, delivered Lancashire ports.

A considerable weight of business has been coming forward in the finished iron trade, with a further upward move in prices. Lancashire bars not being quoted under £5 10s., with North Staffordshire qualities advanced to £5 15s., whilst sheets remain very firm at £7 12s. 6d. The Hoop Makers Association have advanced their list rates 2s. 6d. per ton, random being now quoted £6 2s. 6d. and special cut lengths, £6 7s. 6d., delivered Manchester district, and 2s. 6d. less for shipment, with steel hoops, prices for which have been put up 5s. per ton, quoted £6 10s. for shipment.

A steady business is reported in the steel trade, with prices in some descriptions advanced. Ordinary foundry hematites remain at 57s. to 57s. 6d. less 2½, but ordinary steel billets are not now quoted under £4 7s. 6d. to £4 10s. net cash, with boiler plates firm at £6 7s. 6d. to £6 10s. delivered Manchester district.

In the metal market only a slow business has been doing during the month, the weak tone in raw material having checked buying of any moment, and list rates for manufactured goods remain unchanged, quotations being as under:—Solid drawn brass boiler tubes, 6½d.; brass surface condenser tubes, 7½d.; copper tubes, 7½d.; brazed copper gas and steam tube, 7½d.; brazed brass gas tubes, 7d.; brass wire, 5½d.; copper wire, 6½d.; rolled brass, 5½d.; sheet brass, 6½d.; yellow metal condenser plates, 5½d. per lb.

More enquiry has been stirring in the timber trade recently, and an increased business put through, but imports have been on a liberal scale, and stocks sufficient, although the consumption has been fair. No improvement in prices can be reported. In teak, both logs and planks come in freely, and although deliveries have been fairly satisfactory, supplies are excessive, and prices unchanged. No fresh supplies of greenheart have come in, and with stocks only moderate, it is expected that prices will show an upward move.

In the coal trade a better tone prevails, the increased business enabling some of the pits to get on to full time, and five days is now the general average. Prices are unaltered, except where they have previously been very low, and have now been levelled up to list rates. The improvement in the demand is chiefly in house-fire qualities, due to the approach of the winter season, whilst the lower qualities are finding a readier sale, especially for iron-making purposes, but generally business in round coals is only quiet. At the pitmouth best Wigan Arley still averages 10s. to 10s. 6d., seconds; Arley and Pemberton four-foot 8s. 6d. to 9s., and common house coal, 7s. to 7s. 6d., with steam and forge coal, 6s. to 6s. 6d. per ton. Engine fuel, notwithstanding the increased production of slack, moves off fairly well, with prices steady at 8s. and 8s. 6d. for common, to 4s. 6d. and 5s. for better sorts at the pitmouth.

In the shipping trade only a very slow demand comes forward, with prices as low as ever, common steam coal being readily obtainable 7s. to 7s. 6d., and better sorts 7s. 9d. to 8s., delivered at the Garston Docks on the High Level, Liverpool.

## BELFAST TRADE NOTES.

(From our own Correspondent.)

AS mentioned in last month's Notes, rumours of a threatened strike in the engineering and shipbuilding trades here have been prevalent for some time past. These culminated on Friday, 11th ult., by the fitters, turners, and machinemen belonging to the Amalgamated Society of Engineers stopping work, thus leaving only one branch of the society, namely, the pattern-makers, at work. On the following day, the brass-moulders and brass-finishers struck work also. A week later the iron-moulders also stopped. The direct result has been to entirely dislocate business in the various shipbuilding yards and engine shops in the city. Four of the principal iron-founders have already withdrawn from the masters' association and granted the increase sought for, namely, 2s. per week. The engineers still remain firm in their demand, but a meeting

was arranged between the representatives of the employers and engineers' societies, which took place at Carlisle on Wednesday, 28th inst., and the feeling here seems to be that with a little give and take on both sides matters might be adjusted to the satisfaction of both parties. The opinion of many well-informed people here is that the engineers have been rather precipitate in leaving work without first trying to arrange a conference with the employers as the boilermakers did. Mr. Knight, of the Boilermakers' Society, very sensibly asked his men to remain at work pending negotiations; they have done so and thus retain the entire sympathy of the public. The differences with most of the other trades have been amicably settled for the present.

Owing to the dislocation caused by the strike, there have only been two vessels launched during the month. One is a large steel screw steamer, named the *Vedamore*, from the Southern end of Messrs. Harland & Wolff's yard. This vessel has been built for Messrs. W. Johnston & Co., Limited, Liverpool, for their Atlantic trade, and is to the highest class in Lloyd's. She is 450 ft. long and 48 ft. beam, with a gross tonnage of 6,300. She is fitted on the spar and upper decks, fore and aft, for carrying cattle. There are also a large number of winches and derricks on each hatch to facilitate the loading and discharging of cargo. Her engines are triple-expansion of the most approved type and have been constructed in the engine works of the same firm. The *Vedamore* is the fifth steamer built by Messrs. Harland & Wolff for the Johnston Line.

The second steamer already referred to was launched from the North Yard of Messrs. Workman, Clark & Co., Limited, on the same date. She has been built to the order of the China Mutual Steam Navigation Co., and is the last of the present contract of three. The vessel is similar in all respects to the s.s. *Kintuck* and *Packling*, recently mentioned.

The only new vessel Messrs. Harland & Wolff have completed this month is the s.s. *American*, which left here on Saturday, 12th ult. After running on the mile and adjusting compasses she proceeded to Liverpool. She is owned by the West Indian and Pacific Co., Limited.

Early this month the Orient Line steamer *Oroya* left this port to take up her usual station after having been repaired. She has been in Messrs. Harland & Wolff's hands since 24th March last, when she arrived here in a damaged condition after being ashore in the Bay of Naples. She has had new stern frame put in and other extensive repairs effected, and otherwise thoroughly overhauled. The *Oroya* adjusted her compasses before leaving the lough and went on the measured mile, when everything was found satisfactory. The unusually long time taken to repair this vessel is partly accounted for by a singular dispute between Messrs. Harland & Wolff and the Amalgamated Engineers' Society. It seems that an arrangement was made some years ago that the firm would not start a night shift for less than a week at a time. During the finishing of a vessel about a year ago they had occasion to put a night shift on her, but the work was finished in slightly less than a week. The men accordingly demanded to be paid overtime, not night shift wages, but the firm would not concede this. Since then no engineers have been allowed to work overtime on any of this firm's steamers. It will thus be seen that in a large repair like this they have been severely handicapped.

Messrs. Workman, Clark, & Co., Limited, also dispatched the China Mutual steamer *Kintuck* on the 19th ult. After adjusting compasses and running on the mile, she proceeded to Newport, Wales, where she will load a cargo of coal for Galveston.

The repairs to the White Star steamer *Doric* are now rapidly approaching completion, and it is expected she will leave next week.

The Royal Mail steamer *Norman* will be taken out of Alexandra Dock next week, and proceed as soon thereafter as possible to her usual station.

Work on the s.s. *Cestrian* for Messrs. F. Leyland & Co., Limited, Liverpool, has entirely ceased, all the men employed being paid off pending a settlement.

Messrs. Harland & Wolff also shipped two large marine boilers per the Liverpool steamer for a vessel abroad.

Messrs. Workman, Clark, & Co. are effecting repairs at present to the Irish Lights Commissioners' paddle steamer *Princess Alexandra*. She has been for some time in the dry dock, and is receiving a thorough overhaul to both ship and engines.

No new orders have been placed this month with any of the Belfast shipbuilders.

I may add that one result of the engineers' strike has been to put all the copper works in town on three-quarter time, besides reducing the number of men all round.

The new repairing firm of Messrs. McColl & Co., Limited, have already in hand an extensive repair to the s.s. *Test*, a small coasting steamer owned here. While on her last voyage her thrust shaft gave way, causing a complete smash-up of the engines. She will require a new bed plate and crank and thrust shafts, &c.

## NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

**Barrow-in-Furness.**—The position of the shipbuilding trade at Barrow is not in any sense satisfactory. No new orders have been booked during the month, and some of the work which was expected to come to Barrow has been placed elsewhere, notably the order for two 5,000-ton Clan Line steamers for Messrs. Cayzer, Irvine & Co., of the same type and class as the two now building in the Barrow yards—the *Clan Menzies* and the *Clan Lindsay*. Barrow naturally expected these orders because Mr. Cayzer is the member for the borough and managing owner of the Clan Line. He has taken the work elsewhere, probably because of cheaper quotations obtained from Messrs. Stephens, on the Clyde. The Barrow Co. at present has only these two steamers of Messrs. Cayzer, Irvine & Co.'s on the stocks, and two second-class cruisers, the *Juno* and *Doris*. The work of plating the *Clan Menzies* is proceeding and the *Clan Lindsay* is well in frame. The *Juno* will be launched on November 16th, the ceremony being performed by Lady Evelyn Cavendish, the wife of Mr. Victor Cavendish, M.P., the next Duke of Devonshire. The *Doris* is also well forward with her shell, and with her internal fittings. The Barrow Co. usually builds this class of vessels to a greater deadweight before launching than is the case in other yards, because, first of all, there is a magnificent and safe launching area, and because the appliances and tools for shipwork are practically all on the shipbuilding side of the yard, and the work is more economically done when the launching ceremony is delayed as long as possible. Besides this, on the other side of the yard, in the Devonshire Dock, where the vessels are engined and completed for sea, there is already the *Powerful*, which occupies a deal of room, and the *S. B. Crows*, the sand-pump dredger for the Mersey Board. The latter will be ready for delivery by the time the *Juno* is launched. She is practically full of machinery of all sorts for propelling, sand pumping, circulating, flushing and other purposes. When she is ready for work she will be found an admirable adjunct to the *Brancker*, which has already done such good work on the Liverpool Bar. These two powerful sand-pump dredgers will accomplish for Liverpool what has been for years needed, a direct and easy means of approach up the river for the largest class of steamers at any condition of tide. The importance of this will readily be seen when it is remembered that Liverpool has much to do now-a-days to hold her own in the race for supremacy in the Atlantic trade, which Southampton has begun under such good and promising auspices. It is also of importance because Liverpool river is the entrance to the Manchester Ship Canal, on which a vast increase of traffic is being developed by slow but sure degrees. Much work is furnished for various trades in the construction of the *Powerful*, and quite an army of men are engaged on this monster cruiser. Much progress is being made with the Belleville boilers, with which the *Powerful* will be fitted. The engines are complete, and will soon be ready to turn round in the ship. The marked success of the *Starfish* on the Clyde proves three things—first, that the high rate of speed at which this torpedo-boat destroyer can be driven, the phenomenal small consumption of coal per I.H.P., and the stability of this necessarily somewhat frail craft when facing heavy seas or when answering her rudder at full speed. None the less satisfactory have been the trials of the engines of the *Majestic* line-of-battle ship. These engines, built by the Barrow Co., easily attained the required rate of speed, and worked with perfect smoothness and ease, the coal consumption being relatively small. The difficulty between the engineers and the iron shipbuilders and boiler-makers at Barrow as to which particular trade should do certain jobs on the *Powerful*, has just been settled to the mutual satisfaction of all parties concerned. During the conference between the two trades as to whose duty these

particular jobs was, the work in question was at a standstill, much to the inconvenience of the builders, who were quite ready to give the work out to the trades which may be entrusted with it by the mutual approval of all trades concerned. Of all difficulties, those of this type are the silliest, and cause the most annoyance to all parties concerned. Mr. A. Blechynden has resigned his position as engineer of the Naval Construction and Armaments Co., as he is closing his connection with the firm when the engines of the *Majestic* are "taken over," and when the three torpedo-boat destroyers, *Sturgeon*, *Skate*, and *Starfish*, are handed over to the Admiralty. Mr. James McKechnie, whose last appointment was as managing engineer of the Bilboa yard, has already taken over Mr. Blechynden's duties at the Barrow yard.

**Whitehaven.**—The Whitehaven shipyard as such is doomed. For some years it has been known that any responsible gentleman or a syndicate of gentlemen could have acquired this yard for an old song, on the understanding that they at once proceeded to put it in operation and recommence the work of shipbuilding. There have been no applicants, however, and when the yard was put up for public auction there were no bidders. The Earl of Lonsdale, the Mayor of Whitehaven, therefore acquired the property, and his lordship has now sold the whole yard, excepting only a small piece beyond the lifeboat house, to Mr. J. Davis Wilson and Mr. James Robinson, of Cleator Moor. Mr. Wilson was the blast-furnace manager at the Whitehaven Hematite Co.'s works, having gone there from Distington some four years ago to replace Mr. Crawford. Mr. Robinson has been connected with the Whitehaven Hematite Co. as an accountant. The chief purpose for which the yard has been taken is to work Mr. Wilson's patents in steel castings. All kinds of boiler work will be undertaken, Mr. Wilson having had some 28 years' experience of boilers, and the repairing of ships will be carried on at the patent slip. It is satisfactory to know that at least to some extent the sound of the hammer will be heard again on the site of the now finally extinct Whitehaven shipyard.

**Maryport.**—Shipbuilding at Maryport is still active, and the local yard of Messrs. Ritson & Co. continues to evince much life. They have now on hand a sailing barque, plated and riveted, and a sailing ship framing.

**Workington.**—Much attention has lately been devoted at Workington by Messrs. R. Williamson & Sons to the building of barges. At present this firm has on hand a barque of 150 tons, three small barges of about 50 tons—one of which is ready for launching—three small barges ready to be taken to pieces to ship abroad for Rio de Janeiro, two smaller barges of about 50 tons for Para, two hopper barges for Whitehaven of about 50 tons, one sailing ship plated, and one small coasting vessel in frame.

**The Hematite Trade.**—Very marked activity is noticeable in the hematite pig-iron trade, and a considerable business has been done during the month in both iron for actual consumption and for stock. Prices which were down at 42s. 6d. have been up to 52s., and are still at 49s. net cash warrant sellers. Makers are fully sold forward into January of next year. The indications are strong of a good market next year, and of a heavy consumption of Bessemer qualities of iron for the supply of steel-makers. Rails are in great request, and prices have gone up from £3 10s. to £4 15s. per ton net f.o.b. Other departments of the steel trade are brisk, and there are indications of a general period of activity in hematite iron consequent on a heavy consumption of steel necessitated for a variety of purposes.

**Shipbuilding Material.**—The demand for plates and shipbuilding sections generally is well maintained, and those who have orders to give out have a difficulty in securing prompt deliveries because makers are so fully sold forward. The difficulty of the position is accentuated by the fact that the mills at Barrow are at a standstill on a wages question. The Barrow Steel Co. have orders in hand which they cannot at present execute, and they are not in a position to book new orders forward as it is difficult to say when the men will again resume work. It was thought probable there would not be a resumption of operations at the Barrow Works this year, but as masters and men have agreed on a 8 per cent. increase in wages it is hoped the works will soon be again in full swing. Steel ship plates are at £5 2s. 6d. to £5 5s., less 2½ per cent. discount for cash. Local orders for shipbuilding



material have lately been sent out of Barrow owing to the stoppage of the local works. There is still a brisk trade doing in heavy steel castings for shipbuilding work especially, and orders are well held.

## Miscellaneous.

**Phosphor Bronze.**—This metal, as supplied under various alloys for specific purposes by the Phosphor Bronze Co., has been long before the public, and is highly appreciated by those who have tested its qualities, but it is only as time goes on that its enduring qualities are most certainly emphasized. We have just been favoured with copies of a statement by Messrs. J. S. Fry and Sons, that a bearing in phosphor bronze of a foot step to an upright shaft shows only 1.32 in. wear in 16 years work, during some part of which the shaft was running night and day. Had this not been certified to by a firm of such known standing and accuracy this could hardly have been credible. The Bull's metal for propeller blades seems also to have a most extraordinary malleability and toughness. It is certified that a blade being bent 8 in. out of position at the point was readily straightened and as good as ever, and that one of the blades was actually bent to a right angle and was straightened without difficulty. One would like always to have to do with such metal.

**The Institution of Junior Engineers.**—The annual general meeting of this Institution was held on Friday, October 4th, at the Westminster Palace Hotel, the retiring chairman, Mr. H. J. Young, taking the chair at eight o'clock. The principal business was the presentation of the Council's report on the proceedings of the past year, and the election of officers for the ensuing session. The report showed that steady advancement had been maintained. The membership roll had increased by 45, the total at the present time being 418. At the seven monthly meetings the average attendance had been 78; and at the thirteen "London and neighbourhood" visits the average was 82. The Belgian summer meeting was highly successful. The Institution premium for the best paper read by members during the session had been awarded to that on "The Warming of Buildings by Hot Water," of which Mr. E. King and Mr. Kenneth Gray were joint authors. The library had been well used, but its utility could be greatly increased by the provision of a reading-room, which, together with an office, the Council were hoping they would soon be able to secure, and a fund had been opened for the purpose. The total receipts on general account had been £487 1s. 2d., and expenditure £474 8s. The result of the election was:—Chairman, H. J. Young; vice-chairman, H. B. Vorley; hon. librarian, H. Kempster; hon. auditors, W. H. De Ritter, and B. H. Joy; members of council, A. Anstruther Thomson, E. F. Burt, B. H. Joy and E. King. Remaining in office, H. B. Christ, W. B. Clarke, S. Outler, and A. H. Dykes.

**Catalogue.**—An Illustrated Catalogue of Cable-making and Wire-covering machinery.

We have received the catalogue issued recently by Messrs. Johnson & Phillips, the well-known engineers of Old Charlton, Kent. This catalogue will certainly take its place amongst the reference catalogues of British manufacturers. The papermaker and the artist have done their share of the work of making it attractive and useful. Designs from photographs of actual machinery, constructed by the firm, are given of every appliance used in the modern construction of wire ropes and of submarine telegraph cables. Messrs. Johnson & Phillips are of all manufacturers most practical, for they not only turn out machinery for the purposes which we have indicated to be used by customers, but they also make them for themselves, another part of their business being the construction of wire ropes and cables, and they thus have opportunity, from the actual working of the machines, of seeing when improvements and economies can be effected. The machines illustrated in the catalogue have their various size-numbers quoted. Here we find that, for convenience of customers of various nationalities, the dimensions are given both in feet and inches, and in metrical measure. The floor space required by each machine is given. The size of wire in B.W.G. and the work to be expected from each machine is also given. Attention is particularly called to the large shore-end making machine at the beginning of the catalogue. This is said to be

the biggest ever constructed. But the works are not only capable of making the largest kind of plant, they can also execute orders with rapidity. An instance of this is shown by the fact that in the space of seven weeks they fulfilled an order for 25 large vertical taping and compounding machines, whose combined capacity is no less than 750 miles of covered wires per diem. This fact gives one some idea of the demand for cables, as it would almost appear that the whole world could not find employment for the machinery covered by this one order, if its use were confined to the manufacture of submarine telegraph cables. The illustrations are, as we have already indicated, of very great excellence, and all who are interested in machinery and electricity will find it of great interest. We must not forget to state that a full description of the plant is given in the catalogue itself.

**Admiral Oushakoff.**—On October 3rd the steam trials of the latest addition to the Russian Fleet took place in the Baltic. The *Admiral Oushakoff* is the first vessel of a class which is specially designed for coast defence, but which can also be utilised for foreign service under certain conditions. She has been constructed at the well-known Baltic works at St. Petersburg, where her keel was laid June 16th, 1892, and the vessel launched October 27th, 1893. Her length over all is 283 ft. 6 in.; beam, 52 ft.; mean load draught, 17 ft.; and displacement, 4,126 tons. Although of comparatively small displacement, the *Admiral Oushakoff* carries a powerful armament, consisting of four 10-in. breechloading guns placed in two armoured turrets, four 120-millimetre calibre new pattern quick-firing guns, 24 small calibre Hotchkiss, and four torpedo launching tubes. A complete belt of armour and an armour deck from stem to stern protect the vitals of the ship, all machinery, boilers, &c., being placed below the protective deck. The conditions of the trials were to maintain at least 5,000 I.H.P. for twelve consecutive hours with natural draught and open stokeholds. The results obtained were highly satisfactory, the mean H.P. for 12 hours being 5,764.8, and mean speed 15 knots. All machinery worked with the greatest possible smoothness, a steady steam pressure being easily maintained; the trial was remarkable for its uniformity. The vessel was commanded by Rear-Admiral Delivron, the Russian Technical Committee being represented by General Gambriuk and a commission of experts. The trial was made under the direction of Mr. John Sampson, of Messrs. Maudslay, Sons, & Field, engineers and constructors of the machinery.

**French Torpedo-Transport.**—On October 20th the *Foudre*, French torpedo-transport or dépôt-ship, launched at the Chantiers de la Gironde, was inspired by our own *Vulcan*. She is smaller—5,875 tons (English), as compared with 6,620 tons—but longer—370 ft. 6 in., compared with 350 ft.—and her beam is 52 ft. 6 in., compared with 58 ft. She is thus built upon finer lines, but is somewhat deeper in the water than the *Vulcan*, her draught being 23 ft. 6 in. Defence is provided by a steel deck, with a maximum thickness of 8.5 in. and considerable subdivision of the hull. The whole of the armament is to be quick-firing, and to consist of ten guns of 8.9 in., four of 2.5 in., and four of 1.45 in. The *Foudre* is furnished with powerful apparatus for hoisting in and out the ten vedette torpedo boats which she is to carry upon her deck. These are interesting craft, being built of aluminium. Several of them are ready or in hand, and five more are to be built in 1896. The pattern boat was constructed by Messrs. Yarrow, and attained a mean speed of 20.56 knots at the mouth of the Thames in September, 1894. She displaced 14 tons, and was 62 ft. 4 in. long, with a three-cylinder engine and Yarrow boilers, but was built of French materials, the metal being supplied by a company at Froges, worked into plates, &c., by M. Charpentier Page, of Valdoie, by whose works the materials of the first aluminium yacht, the *Venduesse*, were furnished. The *Foudre* will have engines developing 11,400 H.P., estimated for a speed of 19 knots, and will carry 850 tons of coal.

The Safety Tread Syndicate, Limited (Mason's Patent), have been appointed contractors to H.M. War Office, the Admiralty, and the India Office for the supply of their now well-known Safety Treads.

**Torpedo Boats.**—Secretary Herbert has entrusted the Herreshoff Manufacturing Co. with the contract for building two of the new torpedo boats authorised by the last Congress. Herreshoff was the lowest bidder at 144,000 dols. for each boat.

## LAUNCHES AND TRIAL TRIPS.

## LAUNCHES—ENGLISH.

**Steel Hopper Barge.**—On September 20th there was launched from the shipbuilding yard of Messrs. W. Harkess & Son, of Middlesbrough, a large steel hopper barge for London owners. The principal dimensions are:—Length, 150 ft.; breadth, 33 ft. 6 in.; depth, 11 ft. 6 in. The hopper doors, 16 in number, are worked from a centre girder running fore and aft over the hopper, extremely large quadruple winches being fitted at each end.

**Campania.**—On September 21st an iron steam ketch of 150 tons gross, named the *Campania*, was launched at Beverley, owned by Messrs. E. J. Williams & Co., Limited. Port of registry, Hull.

**Cayo Blanco.**—On September 23rd there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, West Docks, South Shields, a new screw steamer named the *Cayo Blanco*. This vessel is of the spar-decked type, with long poop, long bridge, and topgallant fore-castle, and is of the following dimensions:—Length, 315 ft.; breadth, 41 ft.; depth, moulded, 26 ft. 10 in.; and is classed 100 A1 at Lloyd's under special survey. The steamer is provided with triple-expansion engines, also built by Messrs. John Readhead & Sons, with cylinders 24 in., 40 in., and 65 in., by 42 in. stroke, steam being supplied by two large steel boilers working at a pressure of 160 lbs. per square inch. The *Cayo Blanco* has been built to the order of Messrs. Ernest Bigland & Co., London, and is intended for the American and West Indian trades. The vessel has been built under the superintendence of Mr. Barringer, superintendent engineer to the owners.

**Magnetic and Nomadic.**—On October 1st the *Magnetic* and *Nomadic*, two steam trawlers for the Grimsby Steam Fishing Co., Limited (managers Messrs. Moodys & Kelly), were launched by Earle's Shipbuilding Co., at Hull. They are very similar to the *Robin* and *Wren*, their immediate predecessors in the fleet under the same management, being 93 ft. 6 in. long, 20 ft. 6 in. beam, 10 ft. 6 in. depth of hold, and built to Lloyd's highest class. The machinery consists of triple-expansion engines, working on three cranks, and having cylinders 11 in., 17 in., and 30 in. diameter, by 21-in stroke.

**Bassein.**—On October 3rd an iron steam ketch of 152 tons gross, named the *Bassein*, was launched at North Shields, owned by Messrs. G. Beeching & Co. Port of registry, Fleetwood.

**Gothic.**—On October 3rd an iron steam ketch of 152 tons gross, named the *Gothic*, was launched at North Shields, owned by Mr. E. Kelsall. Port of registry, Fleetwood.

**Marie Elsie.**—On Thursday, October 3rd, Messrs. Wm. Gray & Co., Limited, launched the fine steel screw steamer *Marie Elsie*, which they have built to the order of Messrs. Rodocanachi, Sons & Co., of London. The vessel will take Lloyd's highest class, and her dimensions are:—Length, over all, 324 ft.; breadth, 44 ft.; and depth, 23 ft. 3 in. The deck erections consist of a half poop, bridge over machinery space, and topgallant fore-castle. A handsome saloon and cabins for officers, &c., are fitted up aft, the engineers' rooms are in the bridge, and the crew's accommodation forward, including a bath-room for seamen and firemen. The hull is built on the web frame system with a cellular double bottom. Large hatchways, four steam winches, steam steering gear amidships, hand screw gear aft, two donkey boilers, patent direct steam windlass, boats on beams overhead, shifting boards throughout, stockless anchors, two masts with schooner rig, and complete outfit for a first-class cargo vessel. The Central Marine Engine Works of Messrs. Wm. Gray & Co., Limited, supply fine triple-expansion engines of 1,100 H.P., having cylinders 23 in., 36 in., and 62 in. diameter, with a 39 in. piston stroke, and two large steel boilers to work at 160 lbs. pressure per square inch. The ceremony of christening the steamer *Marie Elsie* was gracefully performed by Miss Baines, of West Hartlepool.

**Barlby.**—On October 4th Messrs. Ropner & Son, of Stockton-on-Tees, launched a steel screw steamer of the following dimensions, viz.:—Length, between perpendiculars, 290 ft.; breadth, 48 ft.; depth, 19 ft. 9 in., which they have built for their West Hartlepool firm. The steamer is of the part awning deck type, and has full poop and raised quarter-deck, her deadweight carrying capacity being 8,500 tons on 18 ft. 6 in. The saloon and cabins for the captain and officers are fitted in

the poop, whilst the engineers are accommodated in iron houses, placed on the awning deck near the entrance to the engine-room. She is built on the web frame principle, leaving the holds entirely clear for cargo; has cellular bottom for water ballast; all labour-saving appliances are fitted for the economical working of the steamer, and also for the expeditious loading and unloading of cargoes. She has steam steering gear amidships, four powerful steam winches, two large donkey boilers, working at the same pressure as the main boilers, patent windlass, stockless anchors, &c. The engines will work up to about 900 effective H.P., and are by Messrs. Blair & Co., having cylinders 22½ in., 36½ in., and 60 in., by 39 in., steam being supplied by two large steel boilers working at 160 lbs. pressure. The vessel was named the *Barlby* by Miss Gwendoline Young, of Wolviston Hall.

**Seaforth.**—On October 5th the South Hylton Shipbuilding Co. launched at Sunderland the steamer *Seaforth*. Her dimensions are 110 ft. by 22 ft. by 8½ ft., and she is owned by Messrs. Thomas Maughan, jun., & Partners.

**Firby.**—On Saturday, October 5th, Messrs. Wm. Gray & Co., Limited, launched a fine steel screw steamer of the following dimensions, viz.:—Length, over all, 300 ft.; breadth, 43 ft.; depth, 19 ft. 9 in. She has been built to the order of Messrs. John Coverdale & Son, of West Hartlepool, and will take Lloyd's highest class. The deck erections consist of poop, raised quarter-deck, and partial awning deck. A handsome saloon, state room and accommodation for captain and officers will be fitted up in the poop, and comfortable quarters for the engineers amidships and for the crew forward. The hull is built with web frames and cellular double bottom, and there is also a large ballast tank in the after peak. Four steam winches, two donkey boilers, steam steering gear amidships, hand screw steering gear aft, patent windlass, schooner rig, boats on beams overhead, shifting boards throughout, and all modern appliances will be fitted. The engines are of the triple-expansion type, working on three cranks. They are supplied by the Central Marine Engine Works of Messrs. Wm. Gray & Co., Limited. The cylinders are 23 in., 35 in. and 59 in. diameter and the piston stroke 39 in. The boilers, built of steel, are of large size, and will give an ample supply of steam at a working pressure of 160 lbs. per square inch. The vessel has been superintended during construction by Mr. Airey, of West Hartlepool, on behalf of the owners. The ceremony of naming the ship *Firby* was gracefully performed by Mrs. R. H. Coverdale, of Hartlepool.

—On October 5th Messrs. Hawthorn, Lealie & Co., Ltd., launched at Hebburn-on-Tyne a steel screw passenger steamer for the Crimean-Caucas line of the Russian Steam Navigation and Trading Co., of Odessa. This is the first of two vessels for the same owners. Her dimensions are 288 ft. by 37 ft. by 27 ft. 4 in., and she will be fitted with machinery of the triple-expansion type, capable of obtaining a speed of 14½ knots.

**Nerite.**—On October 17th Messrs. Sir W. G. Armstrong, Mitchell & Co. launched the s.s. *Nerite* they are building to the order of Messrs. M. Samuel & Co., of London, and making the twelfth vessel now afloat belonging to that firm. The *Nerite*, which has been built to the designs and under the superintendence of Messrs. Flannery, Baggallay & Johnson, of London and Liverpool, to carry oil as well as general cargo, is 375 ft. 6 in. long; 48 ft. beam, and 31 ft. 6 in. depth, moulded, and will carry 6,200 tons of oil in bulk and 400 tons in bunkers. She is constructed under the three-deck rule and under special survey and will be classed 100 A1 at Lloyd's. The vessel will be lighted throughout by electric light with Suez Canal plant, and the arrangements for rapid loading and discharging of cargo, include two duplex pumps of the Worthington make for oil and eight steam winches for general cargo, fed by a large multi-tubular donkey boiler to carry 100 lbs. pressure. The vessel will be fitted with machinery built by the Wallsend Slipway and Engineering Co., Limited, with cylinders, 27½ in., 43½ in., and 78 in. by 48 in. stroke.

**Cranley.**—On Thursday afternoon, October 17th, Messrs. Richardson, Duck & Co. launched from their yard a steel screw steamer of the following dimensions, viz.:—Length, over all, 310 ft.; beam, extreme, 43 ft.; depth, moulded, 22 ft. 9 in.; tonnage, gross, 2,380 tons. This vessel, which has been built to the order of Messrs. Harris & Dixon, of London, will take Lloyd's 100 A1 class and has been built under special survey. She has a poop for captain and officers, bridge over engines and boilers with engineers in after end and a topgallant fore-castle

for crew. A cellular double bottom and after peak tank are fitted for water ballast and the equipment includes steam steering gear, steam windlass, stockless anchors, five steam winches, large horizontal donkey boiler, six derricks and all modern appliances for facilitating loading and discharging. The engines, by Messrs. Blair & Co., have cylinders, 24½ in., 37 in. and 61 in., by 42 in. stroke, steam being supplied by two single-ended boilers, having a working pressure of 160 lbs. She has been superintended during construction by Mr. H. M. Rogers, the owners superintendent, and Captain Martin will overlook the fitting out. As the vessel was leaving the ways she was christened *Cranley* by Mrs. Thomas Middlemiss, of Stockton-on-Tees.

**Phryne.**—On October 19th there was launched from the East Yard of O. S. Swan & Hunter, Limited, Wallsend, a handsomely modelled steel screw steamer, built to the order of Mr. A. C. Le Quellec, of Bordeaux. The vessel has been designed with a carrying capacity of about 4,300 tons deadweight, her dimensions being—330 ft. by 42 ft. by 27 ft. 6 in. moulded depth. She is intended especially for the conveyance of wine between Algiers and the French ports. She is built to the highest class at Lloyd's under the spar deck rule, with full poop, long bridge and topgallant forecastle. A cellular double bottom for water ballast is fitted throughout the full length of this vessel, and water ballast can also be carried in the after peak. The 'tween decks are exceptionally high, in order to more conveniently stow wine casks. The deck machinery is of the most complete description, consisting of four powerful steam winches, steam steering gear, steam windlass, with horizontal multitubular donkey boiler. The propelling machinery has been constructed by the North-Eastern Marine Engineering Co., Limited, and consists of a set of triple-expansion engines, 22 in., 37½ in. and 61½ diameter, by 42 in. stroke, supplied with steam by two large single-ended boilers, working at 160 lbs. pressure. On leaving the ways the steamer was christened *Phryne* by Mrs. Rowland Hodge, the wife of Mr. Rowland Hodge, one of the managers for the builders. The guests afterwards adjourned to the model-room of the builders, where light refreshments were partaken of and the usual toasts honoured. A large number of ladies and gentlemen assembled to witness the launch, amongst whom were Mr. Daniel Le Quellec, son of the owner; Mr. George B. Hunter, the chairman of O. S. Swan & Hunter, Limited; Mr. John Price and Mr. C. S. Swan, directors; Mr. Walker, representing Messrs. Wm. Esplen & Sons, who have superintended the vessel during construction; Mr. A. G. Schaeffer, of the Bureau Veritas; Mr. H. Wilson; Mr. J. H. Irwin, managing director of the North-Eastern Marine Engineering Co., the builders of the machinery.

**Ilaro.**—On Saturday, October 19th, there was launched from the Cleveland Dockyard of Sir Raylton Dixon & Co., Middlesbrough, a fine spar-decked steel screw steamer, which has been built to the order of Messrs. Elder Dempster & Co., Liverpool. This is the tenth vessel built by Sir Raylton Dixon & Co. for the same owners. Her principal dimensions are:—Length, 322 ft. 6 in.; beam, 40 ft. 6 in.; depth, moulded, 27 ft. 11 in., and the deadweight carrying capacity will be about 4,700 tons. The main deck is of steel, spar deck of iron, and poop bridge and forecastle decks of yellow pine. Handsome accommodation is fitted up under the bridge for passengers, captain, officers, and engineers. Engines will be fitted by Messrs. The North-Eastern Marine Engineering Co., Limited, Sunderland, the diameter of the cylinders being 23 in., 36 in., and 59 in. by 42 in. stroke, with two extra large steel boilers working at 160 lbs. pressure per square inch. As the vessel left the ways she was named *Ilaro*.

**Telena.**—On October 19th Messrs. Wm. Gray & Co., Limited, launched the large bulk-oil steamer *Telena*, one of the largest yet built. She is the eighth tank vessel they have built for the Shell Line of Messrs. H. Samuel & Co., and is a sister ship to the *Pectan*, recently launched from the same yard, and of which we gave a detailed account at the time—the over-all length being 388 ft.; breadth, 48 ft., and the depth 31 ft. 6 in., with poop, bridge, and forecastle, and taking Lloyd's highest class. The principal features of her construction are:—Subdivision by very strong bulkheads into sixteen oil tanks, powerful pumps with large pipe lines and numerous valves for dealing with any or all of the tanks at the same time. Powerful triple-expansion engines by the Central Marine Engine Works, the cylinders being 27½ in., 48½ in., and 73 in. by 48 in. stroke, taking steam from three large single-ended boilers at a working

pressure of 160 lbs., engines and boilers placed aft, and are intended to drive the vessel at about 11 knots per hour. All naked fires kept aft and electric lighting fitted throughout. Provision for dealing with cargo at 15 hatchways simultaneously by double the number of winches usually fitted to cargo steamers. Large fan and ventilating arrangements for keeping the holds sweet, so that after discharging oil the vessel takes the most valuable cargoes homewards without their being tainted in the slightest degree. The vessel has been built to the design and under the superintendence of Messrs. Flannery, Baggallay & Johnson, of London and Liverpool. Previous to Messrs. Samuel & Co. inaugurating their Shell Line, petroleum was carried to the East in small cases only, and stringent regulations made by the Suez Canal Co. for the construction of ships for the purpose had to be complied with before it was allowed to be carried in bulk. Messrs. Wm. Gray & Co. were successful in fulfilling the novel conditions required in building the first of the Shell Line steamers, and though they have made improvements in succeeding ships, those first built still answer admirably for the trade. Messrs. Samuel & Co. have erected large storage tanks in the principal ports as far East as Japan, and have secured rights to put up installations at all the ports of India. The *Telena* was christened by Mrs. Samuel, wife of Alderman Samuel, ex-sheriff of the City of London, and head of the owners' firm, who was present, also Sir Wm. Gray, Mr. John Fortescue Flannery, M.P., Mr. and Mrs. W. C. Gray, Mr. Geo. Jones, Mr. and Mrs. T. Mudd, Miss Evelyn Baines, Mr. Sanders, Mrs. T. Robinson, jun., West Hartlepool; Miss Russell, London; Capt. Coundon, Mr. and Mrs. George, Mr. Purvis and others. After the launch the company partook of refreshments in the office, where Sir Wm. Gray, in thanking Mrs. Samuel for coming to the launch, expressed the hope that the new steamer would be even more successful than the *Pectan*, which was already doing excellent work on a remarkably small consumption of fuel. Alderman Samuel replied that he was highly satisfied with the ship just launched, and that the sister ship was doing even better than Sir Wm. Gray claimed for her. He was pleased that this was the eighth of their steamers constructed by Sir Wm. Gray's firm, all of them to his satisfaction. He particularly complimented the builders on the engines of the steamers they had built for them, which without disparaging the work of other eminent engineers, he said, were the best in their fleet, and were a great credit to Mr. Mudd.

**Emu.**—On Saturday, October 19th, there was launched from the yard of Messrs. Cochrane & Cooper, at Grovehill, Beverley, a new steam trawler of the following dimensions:—Length, 102 ft.; and 20 ft. broad; and 11 ft. depth of hold, built to the order of Mr. T. Baakcomb, of Grimsby. The vessel will be fitted with triple-expansion engines of 50 N.H.P., by Messrs. C. D. Holmes & Co., engineers, Hull. As the vessel left the ways she was christened the *Emu* by Miss Charlotte Baakcomb, daughter of the owner.

**Oakwold.**—There has been launched from the yard of Messrs. Cochrane & Cooper, at Grovehill, Beverley, a new steam trawler of the following dimensions:—Length, 93 ft. by 20 ft. 6 in. by 11 ft., which has been built to the order of the Northwold Steam Fishing Co., Limited, Grimsby. The vessel will be fitted with triple-expansion engines of 35 N.H.P., by Messrs. Amos & Smith, Hull. As the vessel left the ways she was christened the *Oakwold* by Mrs. Tom Sowerby. Immediately after the launch the company proceeded to the Beverley Arms, where the customary toasts were proposed and responded to.

**Kherson.**—Messrs. Hawthorn, Leslie & Co., Hebburn, have launched a steel twin-screw steamer *Kherson*, which they are constructing for the Russian Volunteer Fleet. The vessel, which is one of the largest and highest class steamers ever built on the Tyne, is the fourth of the type constructed at Hebburn for the Russian Volunteer Fleet. She is 493 ft. long, 54 ft. broad, and 37 ft. deep. Her capacity exceeds 6,000 tons measurement, and her speed will be 19½ knots. There is stowage for 1,500 tons of coal, and a feature of its arrangement is that by shipping all fuel through the sides of the vessel dust is prevented reaching the decks above. The vessel is of steel, and there are 10 watertight compartments. All the decks are of steel sheathed with teak; and to ensure greater steadiness in rough weather the bilge keels with which the vessel is fitted have been made exceptionally long and broad. The *Kherson* has been built to the highest class for her type at Lloyd's, and in conformity with the Board of Trade regulations for passenger boats.

There is accommodation for 1,600 passengers, and in the 'tween decks, right fore and aft, except where the state-rooms intervene, 1,500 emigrants or troops may be carried. The engines, which are of the triple-expansion type, are expected to indicate 12,500 H.P. on trial. The cylinders are 36 in., 57 in., and 92 in. in diameter, and the stroke 54 in. Steam is supplied by 24 water-tube boilers of the Belleville type, working at a pressure of 250 lbs. per square inch. The vessel will trade between Odessa and Vladivostok, and in time of war will be available as an armed merchant cruiser. Her officers are drawn from the Russian Imperial Navy.

#### LAUNCHES.—SCOTCH.

**Sandval.**—On September 20th Messrs. Thomson launched at Clydebank the *Sandval*, the last of the seven gunboats they were under contract to build for the Spanish Government. The vessels are to be used in suppressing the insurrection in Cuba, and it was stipulated that the lot should be delivered within three months. The contract was signed on the 11th July, but in consequence of the holidays the construction of the boats was not commenced until the 20th. On the 24th August the first—the *Hernan Cortes*—was launched; on the 5th September, the *Pizarro*; two days later, the *Diego Velazquez*; on the 12th September, the *Vasco Miniz de Balboa*; the following day, the *Ponce de Leon*; on the 19th, the *Alvarado*; and on the 20th, exactly two months after the first keel was laid, the *Sandval*. The three months does not expire until the 10th October, but already four boats have been delivered, and the others are expected to be off the hands of the builders by 1st October.

**Madge Ballantyne.**—On September 23rd Messrs. Mackie & Thomson, Govan, launched the *Madge Ballantyne*, a steel screw steamer of about 500 tons, built for Messrs. R. B. Ballantyne & Co., Glasgow. Dimensions:—Length, 162 ft.; breadth, 25 ft. 6 in.; and depth, moulded, 12 ft. 6 in. The engines are of the triple-expansion type, with cylinders of 15 in., 25 in., and 40 in. diameter, and a stroke of 27 in. Messrs. Muir & Houston, Kinning Park, supplied the machinery.

**Wuhu.**—On September 23rd Messrs. Scott & Co. launched at Greenock the steamer *Wuhu*, for the China Steam Navigation Co., Limited. The dimensions of the new vessel are:—Length, 256 ft.; breadth, 38½ ft.; and depth, 21 ft. She is of 2,080 tons gross, and will be supplied by the builders with triple-expansion engines of 1,500 H.P. With the launch of the *Wuhu*, Messrs. Scott have completed the order for ten steamers which was placed with them by the China Steam Navigation Co.

**Prompt.**—On September 27th the tug *Prompt*, constructed by Messrs. William Simons & Co., Limited, to the order of the Crown Agents for the Colonies, was launched complete from their works at Renfrew. The vessel had steam up when taking the water, and a preliminary trial of the engines took place afterwards. The vessel has been constructed under the direction of Messrs. Coope, Son & Matthews, C.E., Westminster, Mr. Wilson Wingate being the superintending engineer.

**Invermay.**—On September 30th Messrs. Russell & Co. launched at Port-Glasgow the last of an order for three three-masted steel sailing barques for Messrs. George Milne & Co., Aberdeen. These vessels register 1,300 tons, and carry 2,400 tons deadweight. Dimensions:—Length, 236 ft.; breadth, 36 ft.; depth, 21 ft. 6 in. The vessel was christened *Invermay*.

**Juanita.**—On September 30th there was launched from the shipbuilding yard of Messrs. David and William Henderson & Co., at Partick, the steel screw steamer *Juanita*, which they have constructed to the order of Messrs. Lamport & Holt, Liverpool. Dimensions are 180 ft. by 34 ft. by 18 ft. 10 in. moulded, and she has been specially designed and constructed to suit the South American coasting trade. The erections consist of a topgallant forecabin, bridge, and a hood aft. The accommodation for officers and engineers is contained in deck-houses on the bridge deck, and includes an engineers' mess-room and a neat saloon in polished hardwood. The crew are berthed in the topgallant forecabin. The main, bridge, and forecabin decks are of iron. The peaks and a partial double bottom are fitted for water ballast. There are two large hatches, with derricks and winches at each, and the arrangements for the rapid working of cargo are very complete. Steam windlass and steam steering gear are fitted, also screw steering gear aft. The outfit

includes powerful towing gear. The builders are also fitting the machinery, which consists of a set of triple-expansion engines, with cylinders 15 in., 23 in., and 40 in. diameter by 33 in. stroke, and a large single-ended boiler constructed for a working pressure of 160 lbs. During construction the engines have been under the supervision of Mr. Morrin, and the hull under that of Mr. Russell.

**Morning Star.**—On October 2nd a steel steamer of 120 tons gross, named the *Morning Star*, was launched at Aberdeen, owned by Mr. T. Walker. Port of registry, Aberdeen.

**Dorothy.**—On October 3rd Messrs. Robert Duncan & Co., Port-Glasgow, launched a steel-screw pleasure yacht, named *Dorothy*, to the order of Mr. William Cumstie Williamson, Glasgow. The keel of the yacht measures 110 ft., with an 18 ft. beam, and a depth of 10 ft. Messrs. Muir & Houston, Glasgow, supplied triple-expansion engines while the vessel was on the ways, and she was launched with steam up. After the launch a short turn of the engines was made, and the yacht was afterwards moored in the builders' dock alongside the yard.

**Onda.**—On October 7th Messrs. A. & J. Inglis launched from Pointhouse Shipyard a three-decked cellular-bottomed steel screw steamer, built to the order of the British India Steam Navigation Co., Limited. The dimensions are:—Length, 410 ft.; breadth, 50 ft. 6 in.; depth, 32 ft. 3 in.; and tonnage, 5,800 tons. The vessel on leaving the ways was named *Onda* by Mrs. Macmahon, of Cardiff. She was then towed to the crane to be fitted with engines and boilers by the builders.

**Port Logan.**—On October 7th Messrs. Russell & Co. launched at Port-Glasgow a three-masted sailing ship named *Port Logan*, of 2,000 tons register, and of the following dimensions:—Length, 266 ft.; breadth, 40 ft.; and depth, 23 ft. 6 in. She has been built to the order of Messrs. Crawford & Rowat, Glasgow, to replace the ship *Port Errol*, which was burned in Lamlash Bay in January of the present year.

**Magdala.**—On October 7th Messrs. Alex. Stephen & Sons, Linthouse, launched a steel screw steamer of 100 A1 class, three-deck rule, for Messrs. MacLay & McIntyre. This is a sister ship to the *Oceana*, launched a few weeks ago, and is the thirteenth vessel built by Messrs. Stephen for the same line. Her dimensions are:—330 ft. by 45 ft. by 28½ ft.; cylinders, 24 in., 39 in. and 64 in. diameter by 42 in. stroke and working pressure 175 lbs. She has poop, bridge-house and topgallant forecabin, double bottom for water ballast, telescopic masts for passing under Manchester Canal bridges, airy and comfortable accommodation for captain, officers, and crew, and all the best considered and most effectively arranged appliances for practical and economical work, both at sea and in harbour. The ceremony of naming her the *Magdala* was gracefully performed by Mrs. Strang, Craignairn, Crosshill.

**Dominic.**—On October 10th Messrs. Barclay, Curle & Co., Limited, launched from their building yard, Whiteinch, Glasgow, a smart-looking screw steamer, built to the order of Messrs. Alfred Booth & Co., Liverpool, and intended for their general trade. The vessel is spar-decked, and built to Lloyd's rules to class 100 A1. She is fitted with all the latest appliances for the rapid discharge of cargo, and with telescopic masts to enable her to go under Manchester Canal bridges. She will also be completely lit up by electric light. The vessel during construction was under the personal superintendence of Messrs. Garland & Beckett. Her dimensions are:—322 ft. by 42 ft. by 28 ft., and will measure 3,000 tons gross. On leaving the ways the vessel was named the *Dominic* by Mrs. Beckett, of Liverpool, wife of the company's engineer superintendent, and was afterwards towed to the crane to be fitted with her engines, which are on the triple-expansion principle, and will be fitted by the builders.

**London.**—On October 16th Messrs. D. J. Dunlop & Co., ship-builders and engineers, Port-Glasgow, launched the first of six steel screw steamers for the Compagnie Generale Transatlantique, for towing purposes in French waters. The dimensions are:—Length, 90 ft.; breadth, 19 ft.; depth, 9 ft. The vessel on leaving the ways was named the *London*. The boilers and machinery will be supplied by the builders.

**Devon.**—On October 17th there was launched, complete from the shipbuilding yard of Messrs. Wm. Simons & Co., Limited, Renfrew, a powerful twin-screw hopper dredger constructed to the order of Messrs. W. Hill & Co. The vessel is fitted with the most recent improvements for the dredging and removal of

blasted rock, and is to be employed at Devonport Harbour. It is propelled by two sets of compound surface-condensing engines, either pair of engines being available for driving the dredging gear. Independent steam hoist gear for the bucket ladder and bow and stern winches. Electric light is also fitted for working night and day. The vessel on leaving the ways was named *Devon* by Miss Davidson, Bellvue Crescent, Edinburgh.

—On October 17th there was launched from the yard of Messrs. John Scott & Co., Kinghorn, a steel screw steamer of the following dimensions, viz.:—230 ft. by 32 ft. by 21 ft. to awning deck. The vessel has been built for the Straits Steamship Co., of Singapore, and has been specially designed for their trade between Singapore and Bangkok. She has teak decks and accommodation for a small number of first-class passengers. She has been built to Lloyd's highest class, and has Board of Trade certificate for passengers. The vessel has been designed to carry 1,200 tons on 13 ft. draught of water, and has large engines and boilers to propel her at the rate of 10 knots loaded. She has been constructed under the superintendence of Mr. Robertson, of Singapore, and Mr. Darling, of the Union Steamship Co. of New Zealand, Glasgow. The usual christening ceremony was performed by Miss Blair, of Cupar, daughter of Captain Blair, of the Tanjong Pagar Dock Co., Singapore. The steamer was launched with steam up, and immediately left for Burntisland.

**Arcturus.**—On Friday, October 18th, Messrs. Ramage & Ferguson, Limited, launched from their shipbuilding yard at Leith an auxiliary steam yacht of 473 tons yacht measurement, built to the order of Rutherford Stuyvesant, Esq., New York, from the designs of Mr. St. Clare J. Byrne, Liverpool. The yacht has three masts and a large spread of canvas, as the owner intends to use her for long foreign cruises, and the propeller is of the Bevis feathering type. The principal dimensions of this vessel are:—Length on low water line, 185 ft.; length over all, 169 ft.; breadth, 27 ft.; depth, moulded, 17 ft. 5 in. The accommodation on board this yacht is of the most complete description, the dining and drawing-rooms being finished in hardwood, while the state-rooms have hardwood dados, with pine enamel painted above. There are two large deckhouses, the one forward containing pilot and chart-house, also smoking-room, the aft one forming a handsome dining-room. The upholstery work in the main saloons consists of amber and blue brocatelle, and in the deck-houses blue embossed leather, and altogether the vessel when completed will be one of the handsomest and best equipped yachts afloat. The machinery consists of a set of triple-expansion engines made by builders, having cylinders 13 in., 21 in., and 34 in., by 24 in. stroke, supplied with steam from two Almy water-tube boilers made at Providence, Rhode Island, America. This experiment will be watched with great interest, as it is the first occasion in which a yacht built in this country has been fitted with these boilers, although numerous yachts in America have them. The yacht has all the most improved appliances for the working of the vessel, including steam steering gear, steam windlass, side winches, electric lighting throughout, and a powerful search light on bridge, &c. On leaving the ways the vessel was named the *Arcturus* by Mrs. John T. Ramage, St. Aubyns, Bonnington. A large company was afterwards entertained to luncheon by the builders, including Lord Provost and Mrs. McDonald, Mr. and Mrs. Herdman, Mr. and Mrs. Wetherston, Mrs. Ramage, Mr. G. A. C. Hutchison, &c., when the toasts usual on such occasions were duly proposed and responded to.

**Horace.**—On October 19th Messrs. D. & W. Henderson & Co. launched from their yard at Partick a large steel screw steamer, named the *Horace*, which they have built to the order of Messrs. Lamport & Holt, Liverpool. The vessel has been built to the 100 A1 three-deck class in Lloyd's registry, and is of the following dimensions:—Length, 360 ft.; beam, 45 ft. 6 in.; and depth, 27 ft., with a gross tonnage of about 3,400 tons. She has been designed with a view of combining large carrying capacity with a fair speed, and the vessel is built on the web-frame system. Water ballast will be carried in a double bottom and peaks; there are two complete decks, the weather deck being of iron; the erections consist of a poop, long bridge, and topgallant fore-castle. The saloon, state-rooms, captain's, officers', and engineers' accommodation are under the bridge deck. The saloon is tastefully decorated, and finished in polished hardwood, and all the rooms are of large size. On the bridge deck is a companion-house and chart-room, and on

the top of this a teak wheel-house and navigating bridge. The crew and petty officers are berthed forward in the topgallant fore-castle. The hatches are of large size, and the arrangements for the expeditious working of the cargo are most complete, including five large steam winches and double derricks. The hull has been built under the personal supervision, on behalf of the owners, by Mr. John Russell, their superintendent. A complete installation of electric light will be fitted by Messrs. W. C. Martin & Co., Glasgow. The machinery will be fitted by the builders, and consists of a set of triple-expansion engines with cylinders 26 in., 43 in., and 71 in. diameter respectively, by 48 in. stroke, and two large single-ended boilers constructed for a working pressure of 180 lbs., and fitted with Howden's system of forced draught. The machinery has been constructed under the supervision of Mr. Morran, the owners' superintendent engineer.

**Dalblair.**—On October 19th the Ailsa Shipbuilding Co., Troon, launched a handsomely modelled steel sailing barque for Messrs. John M. Campbell & Son, of Glasgow. The following are her dimensions:—Length, 247 ft.; breadth, 38 ft.; depth, moulded, 23 ft.; carrying capacity, 2,700 tons dead-weight. The christening ceremony was gracefully performed by Mrs. John R. Campbell, of Glasgow.

**Puri.**—On October 19th Messrs. Gourlay Bros. & Co., Dundee, launched a steel twin-screw steamer for the India General Steam Navigation Co., of Calcutta. The following are the general dimensions of the vessel:—Length, about 275 ft.; breadth, 34 ft.; and depth, about 16 ft. It is intended to place the vessel on the pilgrim and passenger trade between Calcutta and Chonballi. The vessel was christened by Miss Bell, Dunfermline, sister of Mr. J. H. Bell, the company's representative at Chonballi.

**Gloamin.**—On October 21st there was launched from the dockyard, Dumbarton, by Messrs. Archd. M'Millan & Son, Limited, a steel screw steamer, 344 ft. long, 44 ft. 6 in. beam, and 28 ft. 6 in. moulded depth, and of about 5,500 tons dead-weight, which has been built to the order of Messrs. R. A. Mudie & Sons, shipowners, Dundee. Although intended for the general carrying trade the vessel has finer lines and is of more elaborate construction than the ordinary cargo steamer, and her finish and outfit generally are also of a superior description. The deep frame system of construction has been adopted throughout, and ample space for water ballast is provided in a cellular double bottom, which is subdivided longitudinally as well as transversely. The officers and engineers are accommodated in the after-end of a long bridge, and a topgallant fore-castle is fitted for carrying a native crew. A large deckhouse on top of the bridge contains saloon, captain's room, spare state-rooms, &c., and is surmounted by a flying bridge and a roomy chart-house. Powerful triple-expansion engines will be fitted by Messrs. David Rowan & Son, Glasgow. The latest engine-room appliances for economical steaming, including Howden's forced draught, Weir's feed heater, filter and evaporator, will also be supplied. On deck every arrangement has been made for the efficient working of the ship. A complete installation of electric light, including a search light, will be fitted on board by Messrs. W. C. Martin & Co., Glasgow. The ceremony of naming the vessel *Gloamin* was performed by Miss Gertrude Mudie, daughter of Mr. James Mudie, of the owners' firm.

**Excel and Emblem.**—On October 21st Messrs. Mackie & Thomson launched from their yard at Govan the *Excel* and the *Emblem*, two iron screw "fleeters," which they have built for the Great Northern Steam Fishing Co., Limited, Hull. Dimensions:—Length, 103 ft. 6 in.; breadth, 20 ft. 6 in.; depth, 11 ft. 7 in.; gross tonnage, 160 tons. The vessels will be fitted by Messrs. Muir & Houston, Kinning Park, with triple-expansion engines, having cylinders of 11 in., 17 in., and 28 in. diameter respectively, and 20 in. stroke, and boiler 10 ft. by 9 ft., adapted for a working pressure of 160 lbs. The *Excel* was christened by Mrs. James Raeside, Dennistoun; and the *Emblem* by Miss Meiklejohn, Blawartlea, Scotatounhill. The vessels are the tenth and eleventh which Messrs. Mackie & Thomson have built for the same owners.

**Kynance.**—On October 21st Messrs. A. Rodger & Co., Port-Glasgow, launched at high water a handsomely-modelled full-rigged three-masted steel sailing ship of 1,800 tons net register, capable of carrying 3,300 tons deadweight. The owners are Messrs. C. Gordon, Cowan, & Co., Greenock, and the vessel was



gracefully named *Kynance* by Miss Patterson, Paisley. The vessel, which will fit out at Port-Glasgow, measures:—Length, 265 ft.; breadth, 40 ft.; depth, 23 ft. 6 in.

**Titania.**—On October 21st Messrs. Russell & Co. launched a four-masted barquentine of 1,084 tons register and 1,880 tons deadweight carrying capacity. Dimensions:—Length, 210 ft.; width, 35 ft. 6 in.; depth, 19 ft. 6 in. Captain James Fairlie, Glasgow, is the owner, and the vessel was named the *Titania* by Mrs. Marshall, Auchingramont, Hamilton.

**Marselles.**—On October 28rd Messrs. David J. Dunlop & Co., Inch Works, Port-Glasgow, launched the *Marselles*, the second of six small steel screw tug steamers being built and engined for them for town purposes at Constantinople.

#### LAUNCH.—IRISH.

**Cestrian.**—On Saturday, September 21st, Messrs. Harland & Wolff, Limited, Belfast, launched the large steamer *Cestrian*, built to the order of Frederick Leyland & Co., Liverpool, and intended for their Liverpool and Boston trade. The steamer is 512 ft. long, and the gross registered tonnage will be about 8,780 tons, being a sister ship to the *Victorian* and *Armenian*, launched on 6th and 25th July respectively. Messrs. Frederick Leyland & Co. have now three steamers, each over 500 ft. long. The launch took place in the presence of the Countess of Shaftesbury and a large assemblage. The ceremony of naming the vessel was gracefully performed by Miss Martin.

#### TRIAL TRIPS.

**Armenian.**—On September 19th the s.s. *Armenian*, built by Messrs. Harland & Wolff, Belfast, for Messrs. Frederick Leyland & Co.'s service between Liverpool and Boston, left her berth in the Abercorn Basin for trial in Belfast Lough. The *Armenian* is built of steel to Lloyd's highest class, and has the Board of Trade passenger certificate. Her principal dimensions are:—Length, 512 ft.; beam, 59 ft.; depth, 39 ft.; net register tonnage, 5,714; gross, 8,767 tons; deadweight carrying capacity, 10,000 tons; displacement, 17,500 tons; draught loaded, 28 ft. 8 in.; freeboard, 10 ft. 9 in. She is fitted with a cellular double bottom, capable of carrying 1,452 tons water ballast, while her deep ballast tank holds 1,258 tons. Nine watertight bulkheads are fitted, and each compartment is provided with a steam pipe connection for steam injection in case of fire. She is supplied with Hall's patent stockless anchors of great size and weight, and cables 2 9-16 in. diameter. These are worked by one of Messrs. Clarke, Chapman & Co.'s powerful patent windlasses. This very fine engine, which is fitted with very large drum ends for heavy and rapid warping purposes, worked the anchors splendidly. The windlass is, as usual, placed on the shelter-deck, which extends the full ship's length, and when not working cargo this forms a very fine clear deck to the front of the bridge-deck house, and opens up in the way of the hatches to facilitate the work. On the shelter-deck are also five powerful winches, by Messrs. J. H. Wilson and Co., of special design, for working the hatches; four similar winches are also fixed aft. The mooring bits are of massive proportions, and those fixed aft appear to have been placed with some idea of towing. The midship-house is on the shelter-deck, and contains the accommodation for all on board excepting the seamen and cattlemen, who are berthed in commodious fore-castles on the upper deck forward. The passengers' rooms, which are well appointed, are fitted as single berths, and are on the port side; here also a snug smoking-room is provided, and abaft are the engineers' quarters. On the starboard side are the officers' rooms, lockers, cattle foremen's rooms, and the firemen's quarters. On the fore part amidships the saloon is situated. This apartment is most comfortably fitted. The after end of the house is fitted for the accommodation of 80 head of cattle. Aft on the shelter-deck is the wheel-house, containing the steering engine and hand gear. The steam steering machine is one of Messrs. Wilson & Pirrie's. A house containing a very spacious chart-room, wheel-house, and captain's cabin is situated on the upper bridge deck, and can be reached from that deck or entered by means of a stairway ading down to the saloon. This deck forms a splendid ornamade on each side of the engine-room skylight, fidley, and shaft ventilator, and funnel casings. The boats are also

worked from it. The flying bridge is a splendid "navigating platform." On the upper deck, or what is generally called the main deck, fittings are in position for over 820 head of cattle, and these, excepting where prevented by erections, allow of six tiers of beasts. This is only possible in two other vessels, the *Georgic* and *Cevic*. Between Nos. 1 and 2 hatches a house is fitted containing one of the Killoum Patent Refrigerating Co.'s machines, the chill-rooms being situated beneath on the lower deck. The middle or 'tween deck presents a sight probably not to be seen in any other vessel afloat, extending as it does the whole length of the ship between the collision and aftermost bulkheads, and without any interference, except the engine-room casing and stanchions. For cargo-stowing purposes the value of this can be readily understood, and for trooping purposes it would almost be to perfection. The electric light is fitted throughout this deck. The navigating instruments are by Messrs. Baanett, who also supplied the bridge, engine-room, and docking telegraphs. The *Armenian* is a single-screw steamer, and boasts of the largest set of marine engines driving any cargo steamer afloat. They are of the triple-expansion type, and the cylinders measure 31 in., 52 in., and 86 in. diameter respectively, with a stroke of 5 ft. 6 in. On account of the ship's great beam, the engine-room is not cramped at all, and the finish below reflects the greatest credit on Messrs. Harland & Wolff, who supplied the driving machinery. The working parts are very massive, and the shaft is 18 in. diameter. The engines indicate about 4,500 H.P., and are capable of driving the ship 13½ to 14 knots loaded. The auxiliary engines consist of two Weir's automatic feed pumps, each sufficient to keep up the feed supply; the builders' own double centrifugal pump for condenser circulation; Maudslay, Son & Field's main donkey pumps, also one for fire extinguishing and sanitary purposes; a large size pulsometer for ballast tanks, and another one for circulating water through Gilmours' patent evaporator and winch condenser. The feed water is passed through a Railton & Campbell's filter. The fresh water condensers are by Messrs. Hocking & Co., though the fresh water tanks are constructed to carry 350 tons of water. The electric light installation is by Messrs. W. H. Allen & Co., the dynamos being driven by two 10 H.P. engines; 200 lights are supplied. These are to be found throughout the ship. Steam is supplied to the engines at a pressure of 190 lbs. by the two double-ended and two single-ended steel boilers, having a mean diameter of 15 ft., a grate surface of 295 ft. and a total heating surface of 11,600 sq. ft. There are 18 furnaces (Morison's patent suspension), and these are fitted with Henderson's patent automatic self-cleaning furnaces, and Geddes' patent balance fire-doors. The height from top of highest furnace to top of funnel is 90 ft.

**Aries.**—In our report in our September number of the trial trip of the s.s. *Argo*, we mentioned that a sister vessel, the s.s. *Aries*, was then under the sheerlegs at the Central Marine Engine Works, receiving her machinery. This vessel has now been completed, and on September 24th went on her trial trip off Hartlepool Bay. These vessels are of a special shallow draught type, the designs for which have received much attention at the shipbuilding department of Messrs. William Gray & Co., Limited, during the past year or two, with the result that there is now a considerable demand for repetitions of these vessels, and the enterprise and foresight of the well-known local firm of Messrs. Rickinson, Sons & Co., is well exemplified in their having secured for their fleet two of these most modern steamers. The engines are of the triple-expansion type, and were built at the Central Marine Engine Works of William Gray & Co., Limited; their cylinders are 24 in., 38 in. and 64 in. in diameter, with a piston stroke of 42 in. The boiler pressure is 160 lbs. per square inch, and there are two exceptionally large boilers, capable of providing steam at the full boiler pressure under all probable conditions of working. The vessel made her trial trip in a light condition, having only her bunker coal and ballast water on board. The machinery ran entirely without hitch or trouble of any kind, and without the application of water to any of the bearings. The handiness of the machinery in its ready response to the orders of the engine-room telegraph from the bridge, was particularly noticeable, and this is a feature that cannot be overrated in large steamers which have to navigate narrow channels and rivers. The vessel and her machinery have been constructed under the personal supervision of Mr. Chas. E. Smith, the superintendent for Messrs. Rickinson, Sons & Co., who was himself present at the trial trip, and expressed much satisfaction with the work. The engine builders were represented by Mr. T. Mudd, and the vessel is

under the command of Captain Disney, who recently took away for the same owners the s.s. *Arion*, when she was new. Immediately on the conclusion of the compass adjusting and other preliminary work, the vessel proceeded to Blyth to take in her first cargo, making a speed of  $11\frac{1}{2}$  knots along the coast on this, her maiden trip. Like the s.s. *Argo*, she is fitted with Mr. Kitching's patent lubricator, and Messrs. Kitching & Smith's improved stern tube arrangements. There is also one of Mr. Mudd's well-known feed water evaporators, and the engines are also fitted with the triple automatic telegraph, a comparatively new departure in engine-room telegraphs, that is now being regularly fitted to all the vessels engined at the Central Engine Works on account of the absolute security it offers against the possibility of an engineer driving his engines in the opposite way to that in which they are intended to go, and from which cause so many serious accidents have from time to time occurred. We repeat that Messrs. Rickinson are to be congratulated on the possession of these two important steamers.

**Julia.**—On September 25th the steel steam line fisher *Julia*, built by Messrs. W. Dobson & Co., at Walker-on-Tyne, for Spanish owners, went to sea for her trial trip. This vessel is fitted with refrigerating machinery and insulated hold for keeping the fish fresh while running into port.

**St. Tudwal.**—On Wednesday, September 25th, the new steel screw steamer *St. Tudwal*, built by Messrs. C. S. Swan & Hunter, Wallsend, for Messrs. Thomas Lewis & Co., City Steam Mills, Bangor, had a successful trial trip on the mile course off Tynemouth. The steamer is classed 100 A1 at Lloyd's and the principal dimensions are as follows:—Length, over all, 121 ft.; breadth, 20 ft. 6 in.; depth, moulded, 9 ft. 6 in. The engines are compound surface condensing, cylinders 14 in. and 20 in., by 20 in. stroke; working pressure, 100 lbs. The engines have been built by Messrs. J. P. Rennoldson & Son, South Shields. The trial trip was very satisfactory.

**Grand Duchess Xenia.**—On September 26th the steel twin-screw steamer *Grand Duchess Xenia*, built by Messrs. W. Dobson & Co., at Walker-on-Tyne, was taken to sea for her official trial trip, which proved successful, a mean speed of 13 knots being obtained on a number of runs over the measured mile. This vessel has been built to the order of the Archangel-Mourman Steam Navigation Co. for their mail, passenger and cargo service on the Mourman coast. The machinery, which has been constructed by the North-Eastern Marine Engineering Co., Limited, of Wallsend, consists of two sets of triple-expansion engines.

**Kirkstall.**—On Friday, September 27th, the trial trip of the fine steel screw steamer *Kirkstall*, which has just been built by Messrs. William Gray & Co., Limited, and engined by the Central Marine Engine Works, took place off Hartlepool. This boat, whose launch we reported, has been built to the order of Mr. Stephen W. Furness, of Baltic Chambers, West Hartlepool. Her dimensions are as follows:—Length, 275 ft.; breadth, 37 ft. 6 in.; depth, 18 ft. 6 in.; to the highest class at Lloyd's and with all the appliances fitted by Messrs. Gray & Co. in steamers of this class for trading in shallow waters, as reported on the occasion of her launch. The engines are 19 in., 30½ in., and 51 in. diameter, by 36 in. stroke, with two large steel boilers at 160 lbs. pressure. The machinery is also fitted with Messrs. Kitching & Smith's improved stern tube arrangements, Mudd's patent evaporator, Kitching's patent lubricator, and the new triple automatic telegraph of Messrs. Meehan & Sons' make. The vessel left the docks early in the morning and adjusted compasses, after which a party of friends of the owner and builders proceeded on board, and a successful run was made as far as Seaham Harbour and back, the engines working, as is customary with those of the Central Marine build, perfectly smoothly and giving every satisfaction to Mr. Furness and his friends, a speed of nearly 11 knots being maintained. At the luncheon, which was partaken of on board, Captain J. E. Murrell presided, representing the builders, the toast of "Success to the *Kirkstall*" and to Mr. Stephen Furness' new enterprise as a shipowner was duly honoured. Mr. J. E. Guthe, Rev. Walton Armstrong, and Mr. J. F. Kitching (under whose superintendence the ship and machinery have been constructed) were amongst those present, Mr. James Lindsay, of the Central Marine Works, representing the engine builders. After landing the party, the vessel proceeded to Jarrow to load for her first voyage.

**Adra.**—On September 28th the new screw steamer *Adra*

built by Messrs. John Readhead & Sons, West Docks, South Shields, to the order of the English and American Shipbuilding Co., Limited, of which the managers are Messrs. O. T. Bowring & Co., London, was taken to sea on her official trial trip. This vessel, which is 303 ft. long, 42 ft. broad, and 22 ft. 7 in. deep, is of the partial awning-deck type, and has a carrying capacity of 4,800 tons deadweight. She has been built under special survey and is classed 100 A1 at Lloyd's. Her engines, which have also been constructed by Messrs. John Readhead & Sons, are on the triple-expansion principle, having cylinders 23 in., 37½ in., and 61½ in. by 42 in. stroke, steam being supplied by two large steel boilers, working at a pressure of 160 lbs. per square inch. During the trial a mean speed of  $11\frac{1}{2}$  knots was attained. The machinery worked very smoothly, and the trial was altogether satisfactory. After the trial the vessel did not return to the Tyne, but proceeded in ballast to Benisaf.

**Pinner's Point.**—On September 28th the trial trip took place of the steamship *Pinner's Point*. The vessel was built by Messrs. J. L. Thompson & Sons, Limited, Sunderland, for the Norfolk and North American Steam Shipping Co., Limited, for whom Messrs. Simpson, Spence, & Young, of London, Liverpool, West Hartlepool, and New York, are the general managers. The vessel has been constructed to run in conjunction with the *Lambert's Point*, recently launched by the same firm, for the purpose of further developing the ocean traffic between Norfolk, Va., and the chief English, Scottish, and Continental ports, in co-operation with the North American Transport Co. The vessel has been constructed under the spar-deck rules, under Lloyd's special survey, for their highest class, and is about 371 ft. long by 45 ft. beam by 29 ft. 7 in., moulded to the spar-deck height. She has a long full poop aft, and a superstructure from the fore end of the after hatch to the stern, taking in the bridge and forecabin. This superstructure and the poop are specially arranged for the carriage of light cargoes and cattle. On top of these erections is placed the whole of the accommodation for captain, officers, and a limited number of spare berths, with a large handsome saloon, and the usual pantry and sanitary accommodation. Above the saloon is the chartroom and steering-house, surmounted by a large flying bridge. The accommodation for seamen, firemen, petty officers and cattlemen is in the fore-cabin forward, and the after end of the poop is also fitted for the accommodation of cattlemen. The vessel carries a dead-weight cargo of about 5,600 tons, on a limited draught of water, to suit the American ports, and has an exceptionally large cubic measurement capacity compared with her register tonnage. She is built of Siemens-Martin steel, the spar deck being of iron, the main deck of steel, and a portion of the lower deck laid with wood. She is fitted throughout with wood shifting boards in the holds. The vessel is rigged as a two-masted fore-and-aft schooner, a prominent feature on the foremast being the crow's nest for the look-out man. Special attention has been paid to the facilities for the rapid loading and discharging of the vessel's cargo, double derricks being fitted at each large hatch, and in addition a number of portable derricks for the smaller hatches. The deck machinery is of a powerful description, and consists of steam windlass, five steam winches, and three steam cargo hoists. A large steam steering gear is fitted in the engine-room, with controlling gear from the bridge. There is a powerful screw gear aft, while in addition to these steering facilities there is an exceptionally strong quadrant tiller, and spring buffers are fitted to the steering rods. A noticeable feature in the deck arrangements is the large number of mooring bollards, kevels, fairleads, &c., for the expeditious handling of the vessel. The ventilation of the ship is supplied by an extra number of cow ventilators, fitted to meet the American Act. The steam to the deck machinery is supplied by a high-pressure multitubular donkey boiler, placed in the casings. The whole of the shade and poop-deck sides are pierced with sidelights for the lighting of the 'tween decks, while all the accommodation above this shade deck is lighted either by large round brass sidelights or by square plate-glass windows, suitably covered with brass gratings. Almost the whole of the shade deck is laid with iron sheathed with wood, the poop deck being of the best yellow pine. Water ballast is carried in the cellular double bottom and in the after-peak. A number of side cargo and coaling ports and gangway openings pierce the ship's sides for the rapid handling of light cargoes. The rudder is of the latest type of single plate form. A number of the web frames are fitted in the principal holds and in

'tween decks for the efficient stiffening of the vessel, and all frames are carried to the top of the superstructure. The engine and boiler casings and erections on the upper deck are of continuous height, and this, with the addition of the chart and wheel-house at the fore end and the flying bridge above this again, give the vessel a most imposing appearance. Suitable tanks are fitted for the carriage of fresh water for the use of cattle, and a large fresh water condenser is also fitted. Six watertight bulkheads are fitted, dividing the vessel's length, and in addition a number of wood cargo and bunker bulkheads. The whole of the officers and cabin accommodation is of an elaborate description, the panelling being mostly composed of hardwoods, while the fittings, such as lamps, &c., are of electro-plates, and are of a first-class character. The sanitary appliances are of the most modern description, and the whole of the plumbing arrangements throughout the vessel have been designed with a view to their efficient working and to meet the requirements of the cattle trade. The windlass and winch exhaust pipes return to an exhaust tank in the engine-room, thus doing away with floating exhaust steam when working cargo. Four large boats are placed on the bridge, and are fitted with the Board of Trade life-saving appliances. Fore and aft gangways run the entire length of the vessel, and everything points to the fact that careful attention has been given to the general arrangement of the ship. The whole of the work—as is usual with Messrs. Joseph L. Thompson and Sons, Limited—is of a high-class character. The engines and boilers have been constructed by Messrs. John Dickinson & Sons, Limited, Sunderland, and comprise a set of triple-expansion engines of the following sizes:—36 in., 43 in., and 70 in., by 48 in. stroke, the steam being supplied by two large multitubular boilers working at 160 lbs. pressure. The engine and boiler arrangements are of the most complete description, and the auxiliary machinery embraces the most recent improvements for the economical and efficient working of the gear. The winches, already referred to, have been supplied by Messrs. Lynn, of Sunderland, and are fitted with helical wheels, and Delta metal piston rods for the purpose of obviating corrosion, and thus save packing. The hoists have also been supplied by the same firm, as well as the steam steering gear. The boilers have been fitted with Moffitt's patent fire-bars. The vessel attained a speed of 12 knots light. She subsequently proceeded to Swansea to load for America.

**Dunottar.**—This steamer, built by Messrs. Ropner & Son, of Stockton-on-Tees, for Messrs. Macbeth & Gray, of Glasgow, made her trial trip in the last week of September. She is built off the spar-decked rule to Lloyd's highest class, and has full poop, bridge, and topgallant forecastle. She has a deadweight carrying capacity of 5,560 tons. Her engines and boilers are by Messrs. Blair & Co., Limited. They worked smoothly and satisfactorily during the whole trial, giving a speed of 11 knots. One of the owners and Mr. Ropner, jun., were present, the former expressing himself well pleased with the steamer. After the adjustment of compasses she steamed away for Cardiff, where she loaded a cargo for India.

**Achilles.**—On October 1st the trial trip of the s.s. *Achilles*, built by the Elsinore Iron Shipbuilding and Engineering Co., Elsinore, Denmark, to the order of the Steam Navigation Co. "Neptun," Bremen, took place in the Sound. This steamer is built of steel to the highest class at Germanischer Lloyd's, and her dimensions are—200 ft. by 28 ft. 6 in. by 13 ft. 9 in. depth of hold. The engines are of the triple-expansion type. During the trial trip the engines indicated 610 H.P., the result being a speed of 10½ knots with a very moderate consumption of coal.

**Langbank.**—On October 7th the s.s. *Langbank*, recently launched by Messrs. Russell & Co., Port-Glasgow, and engined by Messrs. Dunsmuir & Jackson, Govan, went on her trial trip. This vessel is owned by Messrs. G. M. Steeves & Co., Liverpool, and is a large carrier, her deadweight capacity being about 7,000 tons. She is fitted up with all the latest improvements for quick despatch of cargo, and her machinery works at 200 lbs. pressure. After adjusting compasses she steamed down the Firth, and everything being found satisfactory she proceeded to Cardiff to load. The vessel has been built under the superintendence of Captain McGill, and the machinery under that of Messrs. William Esplen & Son, Liverpool.

**Kut Wo.**—On October 7th the *Kut Wo*, a steel twin-screw steamer of about 2,800 tons gross, built by the London and Glasgow Co. for the river service of the Indo-China Steam

Navigation Co., went on her official trial in the Firth of Clyde. The vessel, which is of a very unusual form, is intended for the Yangtse river in China. The principal dimensions are:—Length, over all, 301 ft.; breadth, over all, 54 ft. 6 in.; depth from top deck, 29 ft. 8 in. The hull is of steel, and is very much heavier than those of the ordinary river steamers of this country. The main deck is steel throughout, and the upper and awning decks, which extend all fore and aft, are of pine, covered with canvas. The whole of the space up to the upper deck is utilised for cargo, most of the tea from the inland towns being carried by these steamers to the coast, where it is transhipped into large cargo carriers like those of the Glen Line. On the upper deck there is sleeping and saloon accommodation for 220 third-class and 180 first-class Chinese passengers in a large deck-house extending nearly all fore and aft. These spaces are thoroughly well lighted and ventilated to suit the hot season, and are also heated with steam for the cold season. The European accommodation is on the top deck, and consists of a large central deck-house, with saloon, passengers' cabins, captain's room, and wheel-house. Side-houses are provided for the engineers, officers, pilots, &c., and all are fitted up in a first-class style. There is a guard all round the ship at the main deck, and the fore part of the vessel is built out to meet it. Gangway doors are fitted at each of the four cargo hatches, and as the cargo is loaded and discharged by porters, there are no winches to disturb the passengers. The hatches and gangways are all on the main deck. Cargo stages are fitted in all the hatches from the hold to the main deck, as all the cargo is handed from stage to stage until it reaches the top. The vessel has Napier Brothers' steam windlass in the forecabin, with capstan above, also Napier Brothers' steam warping capstan aft. Caldwell & Co.'s steam steering gear is fitted in the engine-room, and the vessel is lighted throughout by electricity, this work being done by Messrs. J. H. Holmes & Co., Newcastle. The machinery consists of two sets of triple-expansion engines, capable of developing 1,500 I.H.P. The cylinders are 14 in., 23 in., and 37 in. diameter, and the stroke 30 in. There are two boilers, 13 ft. 3 in. in diameter by 10 ft. 6 in. long, working at a pressure of 160 lbs. They are fitted with Howden's system of forced draught. A horizontal tubular boiler is also provided for working the auxiliary engines. On the trial the vessel did excellently, despite the unfavourable weather, her mean speed on the measured mile being 12·32 knots. The machinery worked with the certainty and smoothness which characterise all Mr. Morrison's work, and from beginning to end of the trial there was not even the slightest suspicion of vibration. Other class the *Kut Wo* is as nearly perfect a specimen as possible, and reflects the greatest credit on the big establishment of which Mr. Shepherd is the head. During the trial the following ladies and gentlemen were on board:—Mr. John W. Shepherd, Mr. William Morrison, Mr. Richard Hughes, Mr. Boyd, Mr. Cheyne, Mr. Colin Buchanan, Captain Young, Mrs. Young and Miss Young, of Fortrose; Mr., Mrs., and the Misses Macadam, Mr. James Beattie, of the Ocean Accident and Guarantee Corporation, and Mrs. Beattie; Mrs. Armstrong, Mr. and Mrs. James Shearer, the Misses Finlay, Mr. Alex. Macadam, Mr. French, Mr. Cock, and Mr. Hocking, of the Admiralty; Mr. James Dick, Captain Lowe, Mr. A. Lang, Mr. and Mrs. John Buchanan, and Mr. and Mrs. P. B. Primrose. At lunch Mr. Shepherd, who presided, proposed "Success to the *Kut Wo*," and Captain Young replied. Mr. Buchanan gave "The Builders," and Mr. Shepherd replied.

**H.M.S. Starfish.**—The trial trip of H.M.S. *Starfish*, the third of the torpedo-boat destroyers built at Barrow for the Admiralty, possessed one or two interesting features. It took place on the Clyde on the 7th October. The specification required that the vessel should maintain a speed of 27 knots on a trial of three-hours' duration with a deadweight of 30 tons on board, the revolutions of the engines necessary to give the speed being obtained by running the vessel six times over the measured mile. As a mean of these six runs, the *Starfish* obtained a speed of 27·87 knots, while the remaining and longer part of the trial was run at a speed of 28·05 knots, making the mean of the whole three hours 28 knots, or one knot in excess of the guarantee. The mean revolutions of the engines were 407 per minute, and the I.H.P. 4,510. The amount of coal consumed on the three hours' run was 15 tons 2 cwt., a figure which works out to a most creditably small consumption per H.P. for forced draught and water-tube boilers. If the speed had been kept down to 27 knots the consumption would have been reduced to between 12 and 13 tons, which is a most excellent result.

The Blechynden type of boiler is used in this vessel. Throughout the trial the steam pressures were easily and constantly maintained close up to the blowing-off point, the rapid fluctuations which often characterise the pressures in water-tube boilers being absent. It was noticeable also that the results were obtained without any wasteful and objectionable emission of flame from the funnels—a point which for ensuring secrecy in night attack is most important. The efficiency of these boilers has been abundantly proved together with their economy and safety as steam generators, while the fact that all or any of the tubes can be drawn and replaced without cutting a single rivet either in hull or boiler casing will give them a very strong recommendation to the engineers of the Navy, as they possess an advantage that cannot be given of any other type of water-tube boilers hitherto fitted in this class of vessel for either British or foreign navies. It should be mentioned that the official trial of the *Starfish* was made on the third occasion on which the vessel had been tried under steam. The coal-consumption trials of the *Starfish* which were made on October 9th, were remarkable in regard to the fact that they displayed the record minimum. The Admiralty officials and the representatives of the contractors took the greatest care to note both the condition of the water in the boilers and in the feed-tanks at the commencement of the coal-consumption trials, and they were left in the same condition as at the commencement of the trials. The result showed for the 12-hours' trial as follows:—Speed, 13.03 knots per hour; revolutions, 166.37 per minute; I.H.P., 404.4; coal consumed during the 12 hours, 8,906 lbs; wet steam per ton of coal, 39.32 towards the termination of the fifth hour it became evident that an improvement might be effected by still further reducing the bar surface. This was done and at the commencement of the sixth hour observations were taken as if a new trial were to be conducted, so that the results of the last seven hours might be obtained independently. The results were:—Speed, 13.11 knots per hour; revolutions, 167.245 per minute; I.H.P., 402.3; total coal consumed during the seven hours, 4,599 lbs., which gives the net steam per ton of coal as 44.8. This is said to be higher than any previous record in this type of vessel built for the British Navy in both the 12 and the seven hours' trials. Previously the highest point was about 38½ knots per ton of coal. As the vessel has bunker capacity for about 70 tons, it is evident she will have a radius of action of from 2,800 to 3,080 knots at 13 knots speed. Observations were afterwards taken of the rolling of the vessel in a cross sea, and it was found that the period of complete oscillation was from 4.4 to 4.8 seconds, which shows the vessel has a very high degree of stability and will afford great safety at sea. It is believed the *Starfish* could easily have developed 5,000 H.P. if the engines could have taken the scheme.

**Forest Brook.**—On October 7th the trial trip of the steamer *Forest Brook*, built by Messrs. Swan & Hunter, Wallsend, took place, and in every way proved a marked success. The vessel is the first that has been built on the turret deck principle of Messrs. W. Doxford & Sons, Sunderland, on the River Tyne, and this was done by a mutual and friendly agreement between the builders and the patentees. The *Forest Brook* has been built to the order of the Forest Oak Steam Shipping Co. of Newcastle, and is the second steamer of the same type that they have had built, the other steamer, the *Forest Oak*, having been built by Messrs. W. Doxford & Son, Sunderland. Mr. H. Sherwood is the managing director of the company, and Mr. W. Charlton the secretary, and both these gentlemen have shown considerable enterprise in having this new type of steamer built. The vessel is of rather large dimensions, her build increasing her carrying capacity to a very great extent. The dimensions of the *Forest Brook* are:—Length, 300 ft.; breadth, 43 ft.; depth, moulded, 26 ft. 6 in. to the harbour deck, and to the turret deck 32 ft.; registered tonnage, 1,729 tons; deadweight carrying capacity, 4,600 tons. She is built entirely of steel, and has every modern improvement as to weight carrying and the comfort of her officers and crew. The propelling machinery consists of a set of triple-expansion engines constructed by the North-Eastern Marine Engineering Co., at their Wallsend works, the cylinders being 28 in., 38 in., and 61 in., with a 32-in. stroke. The boilers are of extra large size, and work at a pressure of 160 lbs. per square inch. The engines are of the builders' latest design, and comprise all the most modern improvements for economical working. The ash ejector from the stokeholds is one of a special kind to meet the new lines on which the ship is built. The ashes are ejected direct into the sea with the least possible manual labour. The boat-lowering apparatus is also of a

special design, as the davits themselves are made so as to swing the boats entirely clear of the ship's protruding sides, and are so arranged that the boats can be firmly held until they reach the water. During the trial trip the engines worked without the slightest hitch, and all concerned expressed themselves as being highly pleased with the working as well as with the finish of the machinery. During construction the machinery has been supervised by Mr. George Jacques, the owners' consulting engineer. At the run over the measured mile the guaranteed speed of ten knots was considerably exceeded with a very small consumption of coal; eleven knots was easily maintained, and this with the boilers working at considerably less pressure than 160 lbs., while the propeller was half out of the water, the vessel being almost entirely devoid of ballast. The steam winches, &c., have been supplied by Messrs. Clarke, Chapman, & Co., Limited, of Gateshead, and are of their latest improved pattern. Every modern appliance for rapid loading and discharging has been fitted to the vessel. After running the measured mile off Whitley, the steamer ran northward as far as Blyth, and then made her way to Sunderland, where she will take in a large cargo of coals for Marseilles; thence she will steam to the Black Sea, and return to the United Kingdom with a cargo of 4,600 tons of grain. For grain cargoes, ships of this type are splendidly adapted, as there is no danger what ever of the cargo shifting, and, if the sanction of the Board of Trade could be obtained, shifting boards could be dispensed with. Amongst those who were on board the *Forest Brook* were Mr. G. B. Hunter, Mr. C. S. Swan, the builders of the vessel; Mr. Hy. Sherwood, the managing owner; Capt. Hogg, the commander of the *Forest Brook*; Mr. T. Middlemiss, Stockton; Mr. J. Gregson, Newcastle; Mr. Wilfrid Jacques, London; Mr. Somers Hunter, representing the North-Eastern Marine Engineering Co.; the Rev. Father Holmes, Gosforth; Mr. Elliott (Messrs. Thompson & Elliott), Newcastle; Mr. John Thompson, Newcastle; Mr. George Jacques, the superintendent engineer for the owners; Mr. Stephenson, yard manager for Messrs. Swan & Hunter; Mr. Arthur Wait (Messrs. James Wait & Co.), Newcastle; and others. Whilst the steamer was at sea the company sat down to an excellent luncheon, over which Mr. Geo. B. Hunter presided, and, in proposing success to the vessel, said that the steamer was the largest of the kind that had been built, except at the yard of the Messrs. Doxford, the patentees of the new system of ship-building. In his opinion, the new design was one that had come to stay, as there were so many advantages gained in steamers of this kind for cargo-carrying purposes. As regards cargo in bulk, such as grain, he thought the Board of Trade would in time relax some of their more stringent rules with respect to shifting boards. He proposed success to the *Forest Brook*, and coupled that toast with the name of Mr. H. Sherwood, the company's managing director. Mr. Sherwood, in responding, expressed himself highly satisfied with the build of the vessel, and his confidence in the new design. Mr. Hunter proposed the health of the commander of the steamer, Capt. Hogg, who, in briefly responding, also expressed his satisfaction with the vessel.

**American.**—On October 8th the new twin-screw steamer *American*, built at Belfast to the order of the West India and Pacific Steamship Co., of Liverpool, left her moorings in the Abercorn Basin, and proceeded for her trial in Belfast Lough. The *American* is of 8,196 tons register, and is 475 ft. long, 55 ft. broad, and 40 ft. deep. She is propelled by direct-acting engines, on the triple-expansion principle, with cylinders 19 in., 31 in., and 52 in. by 48 in. stroke, working at 176 lbs. pressure. After a satisfactory trial and adjustment of compasses, the ship left for Liverpool, to be placed on loading berth.

**Bermuda.**—The *Bermuda*, a new steam trawler built to the order of the Hull Steam Fishing and Ice Co., Limited, by Messrs. Cochrane & Cooper, of Grovehill Shipyard, Beverley, and engaged by Messrs. Amos & Smith, of Hull, has had her trial trip. The vessel is of the following dimensions:—98 ft. 6 in. long, 20 ft. 6 in. broad, and 11 ft. depth of hold. She is propelled by triple-expansion engines, having cylinders 10 in., 16 in., and 20½ in. diameter, by a stroke of 20 in., supplied with steam by a large multitubular cylindrical boiler of steel. In command of Capt. Kelly, assisted by Capt. Richmond (commodore captain of the Red Cross fleet), the vessel went for her machinery trial on October 9th, when a most successful run was made out to sea and home. Mr. Cochrane represented the builders, Messrs. Brackenbury & Wagg the

engineers, and Mr. Beath looking after the interests of the owners.

**Campania.**—On October 10th the *Campania* went upon her trial trip. She is a handsome steam trawler, built by Messrs. Cochran & Cooper, of Beverley, to Lloyd's 100 A1 class. In addition to being the largest trawler from Hull, she is the first vessel of the kind from that port to be lighted by electricity. There are twenty lights on board, including that at the mast-head, sidelights, decklights, to aid the crew when fishing, and a portable lamp in the ice-room. A large number of persons assembled at the St. Andrew's Dock Promenade when the *Campania* was being put into trim for her outing. Amongst those on board were Messrs. E. J. Williams, W. R. Wilson, and H. Hame (representing the owners of the vessel, Messrs. E. J. Williams & Co.), Capt. Cowie (Board of Trade), Mr. Cochran (representing the builders), Messrs. C. D. Holmes and J. R. Smith (representing the engineers, Messrs. C. D. Holmes & Co.), Mr. A. E. Pierson (Messrs. A. E. Pierson & Co., agents for Messrs. Clarke, Chapman, & Co., Gateshead, who supplied the electricity), Mr. A. Golder (managing director of the Ostend Steam Fisheries Co.), Capt. Citeljon (s.s. *Jules Orban de Xivry*, O.S.F.C.), Mr. Haigh (Messrs. Campbell, Haigh, & Co.), Mr. S. T. White (Messrs. S. T. White & Co.), Mr. Clark (manager, Messrs. W. Cussons & Co.), and Messrs. Atkinson, Armitage, F. Blakeney, Camps, J. Grant, Haldenby, Hobbs, Howlett, R. Jackson, and Moore. Immediately after leaving the Humber the vessel was put to a severe test, as also were the seagoing qualities of the trippers. There was a stiffish breeze and a heavy sea running. Indeed, it was so rough that one or two vessels hung about the Humber for a while, rather than venture outwards. At times the waves, resembling huge pillars of water, broke clean over the vessel. Shower baths were numerous. Those who had wished for a trip on the briny in blustering weather had their wants amply satisfied. The test was a severe one for the vessel, but she passed through it remarkably well, attaining a speed of something like eleven knots an hour. Every one interested in her was highly pleased. It was intended to have shot the gear should the weather be favourable, but the circumstances were such that the idea had to be abandoned. Capt. Just—one of the best known skippers in Hull—has charge of the *Campania*. The compasses, which were supplied by Messrs. Castle & Co., were adjusted by Mr. Blakeney.

**On Sang.**—On October 16th the fine steel screw steamer *On Sang*, built by Sir Raylton Dixon & Co., Cleveland Dockyard, Middlesbrough, for Messrs. The Indo-China Steam Navigation Co., Limited, went for her official trial in Tees Bay under the command of Captain Carmichael. The s.s. *On Sang* is 322 ft. 6 in. by 40 ft. 6 in. by 27 ft. 11 in., moulded, and has been built to the requirements of Lloyd's 100 A1 class, spar deck rules, her deadweight carrying capacity being about 4,700 tons. Her poop, bridge and fore-castle decks are of teak. Handsome accommodation is fitted up under the bridge for captain, officers, and engineers, and the crew and firemen are berthed in well ventilated apartments under the topgallant fore-castle. Powerful engines of the triple-expansion type have been fitted by Messrs. The North Eastern Marine Engineering Co., Limited, of Sunderland, having cylinders 28 in., 36 in., and 59 in. by 42 in. stroke, supplied with steam from two extra large steel boilers working at 160 lbs. pressure. The vessel has been built under the superintendence of Mr. Buchanan and Mr. Duncan, the trial trip being highly successful and satisfactory to all concerned. Sir Raylton Dixon & Co. have other two vessels on the stocks for the same owners.

**Clio.**—The new cargo steamer *Clio*, which was launched from the shipbuilding yard of Messrs. J. Scott & Co., Kinghorn, on Thursday, October 17th, and within 24 hours thereafter was loaded at Burntisland with 1,200 tons cargo, went on her trial trip on October 19th, on the Forth. The guaranteed speed of 10 knots an hour was exceeded, the average being 10½ knots. The steamer was put on a four hours' run to test the efficiency of the engines, and the results gave the utmost satisfaction owners and builders. The *Clio*, which has been built to the order of a London firm, is intended for the China trade, and is of the highest class.

**King David.**—On October 18th the fine cargo steamer *King David*, which is the latest addition to the fleet of the King Line, Limited, of Glasgow, of which Messrs. Phillips & Co. are the managers, had a satisfactory trial trip. The mean speed on two runs on the measured mile was about 11 knots. The *King*

*David* was built by Messrs. Short Bros., and engaged by Messrs. Blair & Co., Limited, and carries 4,100 tons on 19½ ft. draught, and after adjustment of compasses the steamer proceeded direct to Antwerp to load a general cargo for the River Plate.

**Daisy.**—On October 23rd the screw steamer *Daisy*, built by Messrs. Blackwood & Gordon, of Port-Glasgow, to the order of the Glasgow, Dublin and Londonderry Steam Packet Co., Limited, of Glasgow, went down the Firth on her official trial trip, when, as the result of several runs on the measured mile at Skelmorlie, an average speed of 12 knots was obtained. The steamer is built of steel to Lloyd's highest class, and her dimensions are—190 ft. by 29 ft. by 15 ft., moulded to quarter-deck, with triple-expansion engines, diameter of cylinders 15 in., 24 in., and 40 in. by 30 in. stroke, and two large boilers, carrying a working pressure of 160 lbs. She is fitted up in a suitable manner for the conveyance of cattle, cargo and passengers, and should prove a valuable acquisition to the firm's fine fleet of steamers engaged in the Irish coasting trade. The owners were represented by Mr. McConnell and Mr. Turnbull, two of the managing directors of the company, who expressed themselves as highly pleased with the result of the vessel's trial runs.

**Yanconver.**—On October 23rd the official trial of the machinery of the new steam fleet *Yanconver* took place. This vessel, built to the order of the Hull Steam Fishing and Ice Co., Limited, is the sixteenth that has been engaged by the firm of Messrs. Amos & Smith for the same owners. The engines are of the triple-expansion type, having cylinders 10 in., 16 in. and 20½ in. diameter by 20 in. stroke. Steam is supplied by a cylindrical multitubular boiler of steel, tested to 840 lbs. per square inch, and working at a pressure of 170 lbs. The hull is 98 ft. 6 in. long by 20 ft. 6 in. in breadth by 11 ft. depth of hold, and has been built by Messrs. Cochran & Cooper, of Beverley, who have also fitted the vessel with the most modern appliances for prosecuting her work on the fishing grounds. A capital run was made out to sea and back, and the times taken showed that a good 10 knots was obtained. Mr. Beath represented the owners, Mr. Cochran the builders, and Mr. Brackenbury the engineers.

**Saint Ronald.**—On October 24th the trial trip of the large steel screw steamer *Saint Ronald*, which has just been built by Messrs. William Gray & Co., Limited, to the order of Messrs. Rankin, Gilmour & Co., Limited, of Liverpool, took place off Hartlepool. The vessel has been built to Lloyd's highest class, and is of the following dimensions:—Length over all, 386 ft.; breadth, 47 ft.; depth, 24 ft. 10 in., with long bridge and topgallant fore-castle. A handsome saloon and state-rooms, together with captain's room, have been fitted up amidships; the engineers' accommodation is also amidships, and the crew's berths forward. The hull is built with web frames, and there is a cellular double bottom for water ballast. Large hatchways are fitted, also powerful steam winches, patent steam steering gear amidships, and hand screw gear aft. There are two donkey boilers, stockless anchors, and iron centre bulkhead to prevent shifting of cargo; two iron masts with fore and aft rig, and a complete outfit for a first-class cargo boat. The engines have been supplied by the Central Marine Works of Messrs. Gray, the cylinders being 24 in., 38 in., and 64 in. in diameter, with a piston stroke of 42 in., and with these two large steel boilers have been supplied, working at a pressure of 160 lbs. per square inch. The machinery is also fitted with Mudd's patent evaporator and Railton & Campbell's feed-water filter. The vessel left the docks early in the morning, and after being manoeuvred in the bay for the purpose of adjusting compasses, etc., proceeded to the Tyne to load for Madras. The average speed on the run round was 11½ knots, her performance giving every satisfaction to those on board. The machinery ran with great smoothness and without a hitch, the boilers providing an ample supply of steam and remaining perfectly steamtight. There were present on behalf of the owners, Mr. John Rankin (managing owner), and Mr. Reid, superintending, who, in conjunction with Captain Davey, who was also present, has superintended the building of the vessel and her machinery. The *Saint Ronald* is the second ship built and engaged for the same firm by Messrs. William Gray & Co.

**Walter Glynn.**—The large and powerful barge-loading dredger *Walter Glynn*, recently constructed by Messrs. Wm. Simons & Co., Limited, for the Mersey Docks and Harbour Board, underwent its steaming trials at Skelmorlie with very



satisfactory results, the mean speed obtained, with and against tide, being ten knots, which is two knots in excess of the contract. The vessel thereafter, with all its gear aloft, proceeded on its voyage to the Mersey, and, notwithstanding a heavy beam sea running, reached its destination in 24 hours.

**Rose.**—The new iron screw trawler *Rose*, built by Messrs. Wood, Skinner & Co., of Bill Quay-on-Tyne, to the order of Mr. John Smart, of North Shields, has had a very successful trial trip at sea. The principal dimensions are:—Length, 91 ft.; breadth, moulded, 19 ft.; depth, moulded, 10 ft. There was a large party of ladies and gentlemen present at the trial, the weather being beautifully fine for the occasion. During the trip several runs were made over the measured mile, the average speed attained during six of these being  $10\frac{1}{2}$  knots. After this test the vessel proceeded along the coast as far as Amble, and then returned to the Tyne. The engines, which are of the compound surface-condensing type, have been fitted by Messrs. Hepple & Co., of South Shields. The cylinders are 14 in. and 28 in. diameter, respectively, by 22 in. stroke, steam being supplied from a steel multitubular boiler, 9 ft. long, by 9 ft. 9 in. diameter, working at 100 lbs. pressure. During the trial the machinery gave every satisfaction to all concerned, working without the slightest hitch or stoppage of any kind and without any water being applied to the bearings. The vessel is replete with all the most modern requirements for ships of her class, and during construction has been superintended by Mr. George Turnbull, of North Shields, the owner's inspector.

**City of Gloucester.**—This steam trawler, the latest addition to the Hull fleet, has lately been on her trial trip. She has been built to the order of Mr. G. W. Bowman, and is fitted with triple-expansion engines of 45 N.H.P., with large cylindrical boiler and Royle's patent evaporator and feed heater. An Otter patent trawl gear has also been fitted to the ship. At the trial the vessel proceeded down to Withernsea, where the measured mile was run, the result showing her to be a good 10-knot ship, and she returned at once to Hull.

## Reviews.

*Transactions of the Hull and District Institution of Engineers and Naval Architects.* Vol. 9. Hull: Goddard & Son. 1895.

THE papers included in the present volume are those read at the meeting of the society in the winter of 1893-4. The interest attaching to them is by no means of an evanescent character, and they are very interesting and valuable contributions to the stock of practical knowledge on engineering and shipbuilding subjects. The first paper, that on the construction and renewal of boiler furnaces, by Mr. A. V. Cister, is characteristic of the class of paper which these societies encourage, to the great advantage of writer, hearers, and readers. The paper contains the observations of a practical man as to the actual behaviour of various furnaces, and as to the method employed in their construction and fitting. He tells us not only how things look for ingenuity on paper, but how they stand the wear and tear of service, and how most easily renewals can be made. Mr. Simpin, too, gives practical hints as to the best way of preventing incrustation in boilers, and thus shows how the life of the boiler may be prolonged, whilst a continuous economy of fuel is effected. The paper by Mr. F. Somerscales is one of a somewhat different class. He gives a description of some of the details in the construction of two first-class cruisers, which, under the programme of the Naval Defence Act, were turned out for the Navy by Messrs. Earle's Shipbuilding Co. The immense amount of elaboration in design of modern warships is brought very forcibly home to the reader, for the information given as to the subdivision of these vessels, and as to the complicated system of steam and hand pumps fitted. The latter, apparently, are simply put in that something may be given for the numerous hands to do. Whether on a complicated fighting machine even such a good object justifies the introduction of unnecessary appliances, may be open to question. The statement as to subdivision, though not altogether new to any of our readers, may very usefully afford food for serious reflection. In each of these ships there are 184 watertight compartments below the protective deck and 57 more above it. This makes 191 compartments in all. The flooding of the two largest compartments in the ship would only admit some 1,650 tons of water (a weight

equal to 22 per cent. of her displacement), and would only cause her to draw an extra 4 ft. of water. As these compartments are flanked by smaller ones in innumerable directions, the probability of both being opened to the sea is remote, and on paper the ship may certainly be said to be "practically unsinkable." But in fact?—There are 352 doors, scuttles, and ports to the compartments which are situated below the main deck alone. Many of these appear in any case superfluous. But even if they are useful their number should be largely cut down. Without going so far as to insist on the principle now gaining recognition amongst mercantile shipowners that bulkheads that contain doors below the water-line ought not to be counted bulkheads at all, we must admit that these too numerous openings are a very great danger, and very much minimise the value of the protection given. If, as the author hints, these matters are forced upon the chief constructor by persons outside his department, it is certainly time that the subject was ventilated in Parliament, so that the lives of British sailors and the safety of British ships be not sacrificed for the supposed convenience of a few officers. One might have thought that the loss of the *Victoria* would have taught this lesson once and for all. We have only space to notice one other contribution. It is the very painstaking and interesting paper by Mr. F. H. Pearson, on "The early History of Steamship enterprises at Hull." Here is another gentleman who tries to pierce the darkness that already enshrouds the beginning of this great industry. It is interesting to note that competition was apparently as keen in those early days as at present, and the weapons used against rivals were of a kind which have long ago been discarded as unworthy.

*Experiments with a New Popularising Photo-Chronograph.* By Dr. A. C. Crehore and Dr. G. O. Squier, Artillery School Press, Fort Munroe. 1895.

THIS is a reprint of a paper contributed to the journal of the United States Artillery, the authors being an assistant professor at Dartmouth College and a lieutenant in the Third United States Artillery respectively. They conducted the experiments with the instrument they describe with a three-inch B.L. field gun for the purpose of measuring the velocity of projectiles. And it may be remarked by the way that they claim to have for the first time proved to demonstration what has long been suspected, that the velocity of a projectile does not reach its maximum until it has travelled some distance from the muzzle of the gun. The chronograph they describe may, however, be used for other purposes besides that for which they used it, and the account they give of its design is most ingenious and elaborate. It has occurred to them that no existing chronographs could be absolutely accurate—although in some cases the error was reduced to a very small one—because they depended upon the starting of a ponderable mass. However slight might be the bulk of that mass it still had a certain inertia, and that took time to overcome. They saw that the only way to get over the difficulty was to have an instrument which came into action without having any inertia to overcome, and they carried out their idea with the utmost ingenuity. They had a ray of white light admitted to a chamber and had its path interrupted by a Nicol prism, which stopped certain of the vibrations. Another similar Nicol prism was then placed further on in its path in such a way as to intercept all the vibrations in the ray which had been allowed by the first to pass. They thus stopped the light as effectually as they would have done had they closed the aperture by which it was admitted with a material shutter, and they avoided the disadvantage of using that which had weight. The revolving of one of the prisms let light pass, and thus it gave full light and complete darkness twice every revolution. But rotating the prism would have again brought in the difficulty of inertia, and so the effect of rotation had to be obtained in another way. This was done by keeping both prisms fixed and interposing in the path between the two a glass cylinder filled with liquid carbon bisulphide. This, when controlled by an electric current, rotated the plane of the polarisation of the light without moving any material thing. This having been accomplished, the rest was chiefly detail, though the working out received the utmost care to insure complete success. The ray of light was provided with a sensitized plate which revolved at a known speed, and by measuring the marks on this plate it was possible to tell exactly the time during which the ray of light was allowed to pass and the intervals of its interruption. The projectile, whose speed

had to be ascertained, controlled the working of the electric current and so timed its own velocity.

A very large amount of scientific detail is given to show exactly how the experiments were conducted and what results were achieved. But for this we must refer readers to the paper itself. We feel sure that the work of the authors will be found of value in other fields than that in which they primarily intended their labours to lie. Its application may, in mechanical matters, lead to the attainment of unexpected results. We may add that there are some excellent illustrations and diagrams appended to the paper.

*American Steam Vessels.* By Samuel Ward Stanton. Smith & Stanton, New York. 1895.

THE first sensation of him who picks up this book is certainly wonder. It grieves us to say that that is followed by a certain disappointment as acquaintance becomes closer. The volume, if one may say so, is a characteristic American product. We doubt if England could produce it at all. We feel certain that if it could, it could not afford to sell it for the equivalent to five dollars, the price at which this is sold. Illustrations and designs are on every page and the volume is a very bulky one. The illustrations too are excellent of their kind, and show infinite pains in execution. Paper and printing are beyond all criticism. From our knowledge of the subject dealt with we make bold to say that the pains taken in execution are as nothing with the infinite labour entailed by the search after materials for the correct representation of the vessels delineated. The aim of the author has been to bring into his collection types of all the steamers which America has produced. He certainly has effected this purpose literally. Yet we cannot think that he has altogether satisfied his readers by his choice of subjects for his portrait gallery. He has well chosen the time of production for his book when the new American warship and the new American mail steamer are showing the world that the United States means to resume its position amongst the great naval powers of the World. The book is absolutely up to date. We find the loss of the naval vessel *Kearsage* chronicled. The latest warships of the United States Navy are here in company with the *St. Louis*, which has only been some three months in active service. Yet we cannot help thinking that the selection of portraits and histories might have been very largely improved. We find here a lot of highly interesting as well as some most uninteresting ships. The ill-fated *Arctic* is rightly here, and we are pleased to see the *Vanderbilt*, the patriotic ship of the Civil War, but we miss, greatly, the *Adriatic*, queen of the wooden ships of the world. There were some dozen great wooden mail steamers of the fifties engaged on the American end of the Atlantic ferry, and of these we find few representatives. These would have been, to British minds at least, far more interesting than many of the steamers built for work upon the great lakes. There seem to be too many trifling vessels included, though, of course, we agree very strongly with Mr. Stanton when he says that America has many peculiar types of vessels for the peculiar work of their rivers, lakes, and sounds, and it is undoubtedly interesting to look through his pages and see how the various types have been evolved in the course of years, and been brought to their present state of perfection. The accounts given of the pioneer steamers of the United States and of the world, will interest everyone. Still, we wish that room could have been found for at least a representative of the fleet of 4,000 ton steamers, which, at the beginning of the seventies, Messrs. Cramp & Sons turned out for the American Line. These vessels were the connecting

link between the old mail steamers which pressed Cunard's so hard before the great Civil War, and the *S. Louis* and the *S. Paul* of to-day, which are taking up the work and threatening the predominancy of the British lines at the close of the century. The *Ohio*, the *Indiana* and their sisters, may not have been very fast boats, but for many years they were the only visible signs that America was still in the Ocean Mail Service. As such they were worthy of a niche in this gallery. The vessel, too, that came over to Europe, and marked down the Cape record to a figure unapproached and unapproachable for years, might surely have been handed down to posterity. The Atlantic mail steamer *St. Louis* of the fifties, would have well come into the same volume as her namesake of the nineties. Yet nothing of the kind is vouchsafed to us. Still, though we confess to disappointment, we see how difficult the task of selection is, and it is possible that Mr. Stanton has chosen those ships for illustration which the American public consider most interesting. The book is one

for the drawing-room table of the man who is interested in the development of steam navigation. Its accuracy is sufficient to entitle it to a place on the library shelves, but the quaint type used is very difficult to the eye. Take the favourite style of giving notes on a white page in blue letters, varied with a blot of blue where the letters become white. It is very pretty and artistic, but it is terribly trying to the eye to have two shocks from change of colour in a single line, and it prevents the book having its full value to the literary man as a work of reference.

The production as a whole shows that the interest in the pioneers of steam navigation is not confined to one hemisphere. We see clearly from what he has told us and shown us that Mr. Stanton has large stores of information of great historical interest still untapped, and we trust that this book will meet with such success as may induce him to bring forth still further treasures, and that when he does so, we may learn something of the neglected giants of the early days.

*Mechanical Engineering.* By Francis Campin, C.E. Weale's Educational series. London: Crosby Lockwood & Co. 1895.

THIS is the third edition of this useful elementary work which is founded upon a larger and more exhaustive treatise written some years ago. The rapid advance of practice in engineering has, however, once more necessitated a re-writing, at least as far as regards the greater part of the volume. Some of the more important chapters, such as those on condensers and controllers of speed, have had more attention given them whilst the chapter on metallurgy is cut out. This omission can well be defended when we remember that there are books in the series which are especially devoted to this subject, whilst it is important not to forget that the regular and steady running of the steam engine has acquired increased importance since the wide adoption of the electric dynamo, which demands a steady and unvarying speed in the engine which drives it. The subjects considered by the author include points which are likely to occur to the student from his first entering into the fitting shop, and everything that is touched upon is dealt with clearly and simply. The mathematical formulae are lucidly explained, and nothing which a little thought and care will not overcome, is put in the student's way. Not only are the materials and parts of the steam engine itself considered, but there is an interesting chapter on railway brakes, as well as a good deal about the strength of materials and of the strains and stresses to which materials are subject and how far they are able to resist them. It should be noticed that the volume contains numerous cuts and has an excellent index.

*The Universal Directory of Railway Officials, 1895.* London: The Directory Publishing Co. 1895.

THIS is the first issue of what, we believe, will be a very useful publication. It contains the names of the various railways of the world under the different countries in which they are situated. The mileage open in each system and the gauge adopted is given as well as the names and addresses of the directors and the principal officials of the company. Where known, the principal items of rolling stock owned by the line are also noted. An index follows, in which will be found the name of every gentleman mentioned in the body of the work, together with the line with which he is connected, and the page of the book at which he is mentioned. A useful appendix follows, in which is given a list of manufacturers of railway plant and appliances and stores. We imagine that this volume will prove a very welcome addition to the library of a very large number of people whose professions and business are connected with this huge and universal interest.

*Steam and the Marine Engine.* By J. Yeo. London: Macmillan & Co. 1894.

THIS book has been some little time before the public, and indeed it has been some little time before ourselves. An apology is due for the delay in noticing it. Our excuse is the great pressure of recent months on our review columns. It is by one who, practically and theoretically, is qualified to deal with the marine engine, and who is also well able to decide what points chiefly need elucidation for the benefit of the naval officers and students for whose use this volume is primarily intended. It is taken from the author's lecture notes at the Royal Naval College, and in working them up into a volume he therefore had in his mind's eye, not only what he thought would be wanted by students,

but—from his experience in delivering the lectures—what the students actually found the cruxes of their studies. The volume is not a large one and the reader soon sees that no superfluous matter is introduced. The opening chapter is introductory and historical, showing the progress of the last sixty years. Then comes a discussion on boilers, which is as it should be, since we must have the steam before we can use it in the engine. The various types of boiler in use are discussed. These include, not only the ordinary single and double ended marine return-tube boiler which has the practical monopoly of the merchant steamers of the world, but also those special types of steam generator which the exigencies of weight and space recommend to the Navies of the world for the purpose of getting the utmost speed in small vessels, and at the same time fulfilling the law of keeping the boilers below the water line, even in vessels of comparatively shallow draught. In this connection we find a description of the now all-important Belleville boiler, to which the British Navy now stands so deeply committed. In view of the recent failure of a water-tube boiler installation in the Mercantile Marine—a failure which has been used by the adherents of the cylindrical type for the purpose of proving that the Admiralty made a mistake in adopting the Belleville—it is interesting to observe that Mr. Yeo, even at the time of writing this book, realised that the feed apparatus is a most important part of the Belleville boiler. It has transpired that the Belleville apparatus was not fitted to the boilers which failed and it is therefore not fair to use the incident as a case in point against the Admiralty. If an important part of an invention be neglected the inventor cannot justly be called to account for subsequent failures. Details of the working parts of marine engines are illustrated and described, the illustrations in this part of the work, as elsewhere, being models of clearness and good execution. Attention is also given to auxiliary machinery and, of course, to feed water heating and purifying, matters which are found to affect, so materially, the life of the boiler. A chapter is added on the theory of propulsion, and another on coal combustion. In fine, the book is one which will prove a very useful aid to the student at Keyham, and to the junior engineer in the Mercantile Marine.

### Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from September 13th to October 9th, 1895.

- 17048 H. Wormald. Pistons and gland packings.
- 17053 M. Samuel and P. Trettin. Steam boiler.
- 17069 R. Rhett. Propellers for vessels.
- 17075 W. H. Sorfleet. Stop valves.
- 17081 T. M. Favell. Indicating engine strokes.
- 17095 T. Owen. Self-lubricating bearings.
- 17125 G. F. Parratt. Life-saving apparatus for ships.
- 17129 J. C. R. Okes. Internal combustion engines.
- 17131 W. Harrison. Cows.
- 17148 J. C. S. McLay. Non-conducting pipe cover.
- 17156 J. Marr (F. Kodolitsch, Austria). Hatchway covers.
- 17200 Société Anonyme du Générateur du Temple. Tubulous steam boilers.
- 17204 C. L. A. F. Büttner. Flame tube boilers.
- 17208 W. Pilkington, C. T. Bishop, A. Brownsword, and A. Pilkington. Metallic tubes.
- 17209 T. Taylor. Bearings for shafting.
- 17221 A. Blechynden. Steam generators.
- 17243 H. Stanbridge. Deep-sea diving apparatus.
- 17244 H. W. Hollis. Heating steel or iron ingots.
- 17255 C. Coerper. Steering apparatus for ships.
- 17259 T. Crabtree. Metallic packing.
- 17261 J. D. Ellis and J. Nodder. Steam boiler furnaces.
- 17262 J. D. Ellis and J. Nodder. Steam boiler furnaces.
- 17266 F. Lhuillier. Life-saving jacket.
- 17267 H. Schon. Diving apparatus.
- 17275 C. K. Mills (Messieurs Thevenin Freres and Cie., France). Cocks for water gauges.
- 17291 W. Thomas. Boats' chocks disengaging gear.
- 17293 C. H. Guest. Valves.
- 17331 W. P. Thompson (W. Kirkwood, United States). Steam pumps.
- 17344 A. Krausen. Boiler feed apparatus.

- 17357 W. F. and E. W. Cleveland and A. M. Peterson. Steam engines.
- 17358 C. W. Burton. Friction clutches.
- 17388 D. F. Black. Water-tight bulkheads.
- 17390 H. F. Massey. Operating the valves of steam hammers.
- 17403 J. Yates and E. Bowden. A new steam trap.
- 17415 J. C. Robinson. Releasing and attaching boats.
- 17425 Galloways, Limited, and H. Foster. Boiler furnaces.
- 17432 F. Le Poidevin. Boilers of heating apparatus.
- 17447 P. Jacquin. Speed indicators.
- 17452 W. Wallace. Expanding propeller for vessels.
- 17456 H. Wood and E. C. Holden. Governing steam engines.
- 17457 H. Wood and E. C. Holden. Governing steam engines.
- 17471 S. J. Currah and G. N. Mathews. Angle plates.
- 17491 P. C. Homburg. Firegrates for forced draught.
- 17500 Galloways, Limited, and J. H. Beckwith. Corliss valve gear.
- 17512 N. Tverskoy. Feeding water-tube boilers.
- 17513 N. Tverskoy. Construction of water-tube boilers.
- 17543 S. Lumb. Self-acting lubricators for shafts.
- 17552 S. Clarke. Direct-acting pumping engines.
- 17561 W. Mace and T. Elcoate. Bulkhead doors.
- 17577 C. G. P. de Laval. Feed-water supply.
- 17579 C. E. Hæge. Inflatable life-belt.
- 17606 J. Coleman and D. Heggfe. Keels for sailing yachts.
- 17627 P. B. J. Willis (T. W. Smith, United States). Antifric-tion metal.
- 17641 S. Shepherd. Trawl nets for fishing purposes.
- 17652 C. G. Rodeck. Floating building.
- 17663 C. J. F. de Vos. Securing boats on board ship.
- 17676 A. Harcourt. Internal combustion engines.
- 17684 O. Abraham and H. Meisel. Steam engines.
- 17696 G. W. Marsden. Sextants.
- 17702 J. G. Galley and A. Stagg. Packing for glands, &c.
- 17722 E. Petersen. Water-tube steam boilers.
- 17789 D. Clerk (H. Lacy, L. F. Johnson, and W. J. Slacke, United States). Torpedoes.
- 17817 J. G. Accles and P. L. Renouf. Tubes.
- 17834 T. P. Marsh. Vertical steam boilers, &c.
- 17837 P. C. W. Shaw and T. E. W. Noyes. Wire rope or cable.
- 17847 R. D. Mayo and D. A. McLeod. Lifeboat or float.
- 17871 W. L. Gunn. Protecting ships' bottoms.
- 17903 A. Liddell. Joint pieces for steam pipes.
- 17932 Davies Bros. & Co., E. A. Davies, and S. T. Thomas. Metal sheets.
- 17933 W. Pattinson. Valves and valve gearing.
- 17937 E. H. Nacke. Stop valves.
- 17946 P. J. McGrath. Upright boilers.
- 17949 E. Krönke. Copper-coating ships' hulls.
- 17952 H. H. Leigh (F. V. Macquaire, France). Pilot floats.
- 17953 J. S. Wyndham. Valves of feed, &c., pumps.
- 17954 W. Holt. Tube stoppers for boilers, &c.
- 17968 J. Hutcheon. Corrugated furnaces.
- 17980 B. Wesselmann and G. Booker. Reduction of friction.
- 17983 J. W. Just. Protectors for torpedoes.
- 17988 W. T. Lord. Boat propellers.
- 18031 W. Hawkins and W. J. Butler. Stopping holes in ships.
- 18070 E. H. Norris and C. G. Henty. Valve gear.
- 18072 F. W. Dunston and M. Anderson. Steering vessels.
- 18085 P. V. Gelder. Purifying air in ships' holds.
- 18088 W. J. Watt. Combination of valve mechanism.
- 18133 G. Weir. Apparatus for discharging water, &c.
- 18154 E. G. Brewer (the firm of Gebrüder Stern, Germany). Lubricator.
- 18174 H. T. Wright. Apparatus for condensing steam.
- 18193 W. F. Hobdell. Covering steam pipes, &c.
- 18198 A. Velluet and F. W. Mackie. Preventing vessels from foundering.
- 18200 F. M. Lewis. Arc lamps for search-light.
- 18204 J. Ball. Tell-tale for fishing-net.
- 18264 R. Evans and J. H. Hosgood. Shipment of coal.
- 18267 P. Ford. Ships' davits.
- 18270 A. Montupet. Multitubular steam boiler.
- 18272 F. J. Parkin. Valve for furnaces.
- 18298 B. Dyson. Lubricators.
- 18333 F. A. Tagliaferro. Winch grip holder.
- 18336 K. K. Lake (Société Anonyme des Acieries Forges et Ateliers de la Biesme, Belgium). Steam engines.

18354	N. Tverskoy. Compound steam boiler.
18360	H. H. Leigh (L. G. Ljungstrom and W. G. C. Harmsen, Sweden). Steam engines.
18363	W. H. Wheatley (W. E. Prall, United States). Engines.
18379	J. Johnston. Gas and petroleum engines.
18382	W. Deighton. Steam generators.
18400	B. P. Stockman. Armour-plates.
18423	G. S. Young. Triple-expansion engines, &c.
18431	J. P. Lea. Gas and oil engines.
18444	J. Goodman. Governors.
18479	G. Gates. Metallic packing.
18498	H. S. E. Hobday and W. Reece. Launching boats.
18499	G. H. D. Birt. Boards for trawling nets.
18515	J. O. Gilbert and J. Hoppington. Steam boilers.
18519	G. Quick. Propelling water-borne vessels.
18525	G. F. Priestley and W. S. Bancroft. Steam generators.
18533	J. Findlater. Steamships for conveying oil.
18540	T. Beeley. Steam superheating apparatus.
18577	A. Reader. Life-preserving bathing dress.
18580	W. Tyree. Launching boats.
18620	H. Wilcke. Steam generators.
18630	T. Sudron. Vertical boilers.
18643	A. M. Spencer. Compound armour-plates.
18663	W. H. Harfield. Ships' steering gear.
18683	J. A. Menck. Dredging apparatus.
18706	R. D., W. D., and H. C. Cundall. Oil engines.
18722	A. W. Paul. Condensers.
18789	L. de Maio. Revolving piston steam engine.
18781	F. A. Tagliaferro. Propellers for ships.
18801	J. E. Gresty. Steam generators.
18812	J. Chalmers. Multiple cylinder engines.
18820	L. Grote. Hydraulic motor engines.
18845	J. Dean and C. R. Carpenter. Marine conveyances.
18863	G. L. Alward. Davits.
18873	J. Bonner, C. D. Mott and H. Hermansen. Valves.
18892	G. H. Robinson. Valves for steam engines.
18900	W. High. Trawling.
18932	W. Kirkaldy. Water-tight bulkheads.

## BOARD OF TRADE EXAMINATIONS.

EXTRA FIRST CLASS.  
October 19th, 1895.

Bell, R. C. W. ... Ex 1C North Shields  
Burl, C. M. .... Ex 1C London

NOTE.—1C denotes First Class; 2C, Second Class.

September 21st, 1895.

Allan, J. ....	1C London
Angus, G. ....	1C Aberdeen
Armstrong, W. .	1C Liverpool
Bing, H. ....	2C London
Diggle, Wm. F. .	1C Liverpool
Galloway, W. T. .	2C W. Hrtipl
Gibbs, F. E. ....	2C S'th'pton
Hoey, John ....	2C Liverpool
Hughes, Robert. .	2C "
Jacobson, A. ....	2C London
Kidd, R. ....	2C Aberdeen
Leech, F. G. ....	2C London
Malcolm, M. ....	1C Glasgow
Millbank, A. B. .	2C London
Newbold, W. A. .	2C "
Parkin, Arthur .	2C Hull
Pert, George ...	1C Liverpool
Smart, A. W. ....	2C S'th'pton
Smith, J. V. ....	2C W. Hrtipl
Smith, Robert.. .	1C Liverpool
Tulloch, D. ....	2C Aberdeen
Whiteford, J. E. .	2C Bristol
Whyte, R. ....	2C Glasgow

September 28th, 1895.

Arrowsmith, S. .	2C N. Shields
Barton, E. G. ....	2C London
Bear, R. H. ....	2C N. Shields

Bell, M. R. ....	2C N. Shields
Buchanan, W. D. .	1C London
Burbridge, E. H. .	1C "
Cameron, A. B. .	2C N. Shields
Cooper, J. C. E. .	2C "
Doig, W. K. ....	2C Sun'land
Earl, W. ....	2C N. Shields
Everett, A. J. . .	2C "
Falkenberg, O. .	1C "
Gardner, Arthur .	1C Liverpool
Green, Joseph ...	1C "
Hartness, C. ....	2C N. Shields
Howard, J. ....	2C "
James, A. A. ....	2C "
Long, G. T. ....	2C London
McCrick, D. ....	2C Liverpool
McDonald, R. ....	2C N. Shields
May, C. S. ....	1C London
Pelton, F. ....	1C N. Shields
Richards, A. ....	1C London
Richardson, I. .	2C N. Shields
Stewart, H. A. .	2C London
Walker, T. M. ....	2C N. Shields
White, A. G. ....	1C London
Young, J. H. ....	2C Sun'land

October 5th, 1895.

Aitken, D. R. ....	2C Glasgow
Ashton, A. W. ....	1C London

Birohall, John..	1C Liverpool
Brown, G. W. ....	2C London
Buesnel, P. T. W. .	2C "
Bulman, G. B. .	2C N. Shields
Burkett, J. E. ....	2C "
Burns, R. ....	2C Glasgow
Cameron, A. J. .	1C London
Clements, P. ....	2C "
Condon, J. ....	2C N. Shields
Daniels, R. W. .	1C London
Dickie, J. ....	1C Glasgow
Farne, W. H. ....	1C N. Shields
Ferguson, A. Y. .	2C London
Ferrier, A. D. . .	2C Glasgow
Franks, John W. .	1C Liverpool
Gibbons, E. ....	2C Cardiff
Grayston, W. . .	1C London
Haisley, John..	1C Liverpool
Hosgood, O. S. .	1C Cardiff
Jones, J. T. ....	1C "
Marley, F. C. . .	1C N. Shields
Martin, T. W. ....	1C "
Munro, W. ....	1C Glasgow
Nelson, F. F. . .	2C London
Newton, H. E. . .	2C "
Owen, Owen H. .	2C Liverpool
Pinn, F. W. ....	1C London
Price, R. ....	1C "
Purdon, J. ....	1C Glasgow
Reid, W. ....	1C London
Robertson, M. . .	2C N. Shields
Schellin, C. A. R. .	1C N. Shields
Silley, J. H. ....	1C London
Smith, James . .	1C Liverpool
Thomas, G. E. . .	2C Glasgow
Thomson, A. . . .	1C "
Thomson, J. G. .	2C "
Vacarizza, Jose L.	2C Liverpool
Warren, W. A. .	1C London
West, James ...	2C N. Shields
Whyte, D. ....	2C Cardiff

October 12th, 1895.

Adamson, P. A. .	2C London
Anderson, R. . .	1C Leith
Baillie, J. ....	1C Dublin
Barrow, W. ....	1C N. Shields
Bennett, E. H. .	2C Hull
Brown, W. F. ....	2C N. Shields
Buchanan, D. G. .	2C Greenock
Bucknill, H. C. .	2C Liverpool
Caughie, J. ....	2C Greenock
Christie, J. C. . .	2C Aberdeen
Fleming, R. ....	2C Leith
Gibson, J. ....	2C Greenock
Holmes, S. ....	2C Dublin
Kitching, W. A. .	2C Hull
Lightfoot, Wm. .	2C Liverpool
Lucas, S. ....	2C Hull
McDonald, A. ....	1C Leith
McLure, M. ....	2C Greenock
Martin, W. ....	2C "
Muldoon, H. ....	2C Liverpool
Murphy, B. S. . .	1C Greenock
Murphy, J. H. . .	1C "
Niblock, Fred. .	2C Liverpool
Paterson, J. ....	2C Greenock
Ramsay, J. B. . .	2C Leith

Redman, W. . . .	2C Hull
Roy, J. ....	1C Greenock
Rudd, G. W. ....	2C N. Shields
Sharp, H. W. ....	1C "
Stalker, J. ....	1C Leith
Willcox, R. J. .	2C N. Shields
Wilson, Samuel .	2C Liverpool
Wood, H. E. . .	1C Greenock
Woodcock, J. S. .	2C N. Shields

October 19th, 1895.

Alison, J. ....	2C Glasgow
Allison, P. B. . .	2C Dundee
Anderson, W. J. .	2C Liverpool
Bell, T. ....	2C W. Hrtipl
Bowman, J. M. .	2C N. Shields
Brasier, A. ....	1C London
Budworth, J. H. .	2C Liverpool
Burn, J. ....	1C W. Hrtipl
Christiansen, N. .	1C S'th'pton
Cordon, J. L. . .	2C W. Hrtipl
Coundouris, G. .	2C Dundee
Craik, R. ....	1C Cardiff
Daniel, J. W. ....	1C Aberdeen
Farlam, T. ....	1C N. Shields
Fenwick, F. ....	1C "
Fraser, J. W. . .	2C London
Glendenning, C. .	2C W. Hrtipl
Greir, A. ....	2C Glasgow
Grier, Robert . .	2C Liverpool
Guildford, J. . .	2C N. Shields
Hadden, S. M. . .	2C "
Hodder, G. W. . .	1C London
Hounsom, W. . .	1C N. Shields
Jackson, Henry .	2C Liverpool
Jenkins, T. ....	2C Cardiff
Jenkinson, C. . .	1C W. Hrtipl
Kerr, D. W. . .	1C Dundee
Laurence, G. C. .	1C Glasgow
Lord, A. C. ....	1C "
McAndrew, A. . .	1C Aberdeen
MacFarlane, J. .	2C Glasgow
MacFarlane, R. .	2C Liverpool
McGlashan, J. .	1C W. Hrtipl
McHardy, J. . .	1C London
MacKay, A. ....	1C Glasgow
McMeekin, J. . .	1C "
Mair, H. K. ....	2C Dundee
Mansfield, R. P. .	1C Liverpool
Martin, Wilfred .	2C "
Matheson, H. . .	2C Glasgow
Mossman, J. R. .	2C Liverpool
Nicholson, C. . .	2C "
Read, W. ....	1C Plymouth
Richardson, J. J. .	1C N. Shields
Richmond, M. . .	2C "
Russell, J. ....	2C Aberdeen
Seevrs, J. ....	2C W. Hrtipl
Stark, T. ....	1C Glasgow
Taylor, E. J. . .	2C Liverpool
Thomas, A. J. . .	2C Cardiff
Thompson, J. W. .	2C Liverpool
Trimming, E. . .	2C London
Tunnicliffe, L. .	2C Liverpool
Weatherall, H. .	1C W. Hrtipl
Whittet, A. . . .	2C Dundee
Wrate, C. E. . .	2C N. Shields

**Liverpool Engineering Society.**—The opening meeting of the 22nd session of this society was held on the evening of Wednesday, October 30th, at eight o'clock, when the President-Elect, Mr. Arthur J. Maginnis, M.Inst.N.A., delivered his inaugural address. For the succeeding meetings several papers will be read. The following are of interest to our readers:—8th Jan., 1896, Mr. J. R. Fothergill, M.Inst.Mech.E., "Consumption in Marine Boilers"; 5th Feb., 1896, Mr. W. G. P. Macmurdow, "Some Instruments for Measuring and Recording Electrical Energy"; 4th March, 1896, Mr. D. J. Howells, "Water-tube Boilers"; 18th March, 1896, Mr. Fortescue Flannery, M.P., M.Inst.C.E., "Refrigerating Machinery on board Ships, with notes on some recent casualties."

# The Marine Engineer.

LONDON, DECEMBER 1, 1895.

THE note of radical administrative reform in the Army has at last been clearly sounded consequent upon the retirement of the chief, who has so long and so ably represented the old school of ideas. Why should not the Naval Administration and the Board of Trade show themselves equally ready to move with the times, and to adapt themselves to the condition of affairs both in the Navy and in the Mercantile Marine which has converted Britain's wooden walls into complex engineering triumphs and factories, where their fighting and sea-going capabilities depend entirely upon engineering skill and science? Already large steamship owners employ engineers to superintend the construction and working of their fleets, and place under their control, not only the engineering staff, but also the nautical staff, including commodore captains. The modern steamer or ironclad, often mastless, is the creation of the engineer and the naval architect. They build it and design it; they fill it full of wonderfully complex appliances to fulfil all its varied functions, both as a sea-going and fighting monster. If it fails in any appointed task, it will be by reason of a failure in its engines, boiler, or fighting mechanism, and yet the supreme control both on board and in the administrative and executive departments is left in the hands of those who are mere babies in their personal knowledge of the mechanism upon which the sea-going or fighting capabilities depend. When shall we see this properly recognised by one at least of the Lords of the Admiralty being a properly qualified engineer and naval architect? In the Marine Department of the Board of Trade, the post of professional adviser to the Secretary and assistant Secretary of the Marine Department has been represented for a generation by an experienced shipmaster, who, when elected twenty years ago, was, no doubt, as representative a man as could be got of general naval knowledge. He is now about to retire, and, no doubt, the berth will be

early sought for by other shipmasters as his successor. By this time, however, the Mercantile Marine must have been engineered out of all knowledge of the old race of shipmasters, and surely an engineer and a naval architect thoroughly *au fait* to the requirements of the service of the present day would be the most suitably qualified man for such a post. When this necessity has been recognised, and it will come sooner or later, the Board of Trade will find itself much better able to cope with the

march of modern progress, the engineer surveyors will be treated as they ought to be, not only on a par with, but as leaders of, the nautical surveyors, disputations between the controlled and the controlling bodies on mechanical technical matters will be less rife, the dignity of the controlling body will be enhanced, and we for one shall be inclined to think the millennium is not far off. May we live to see it.

THE Institution of Junior Engineers has been honoured by the acceptance of its presidency by Archibald Denny, Esq., M.Inst.N.A., who has inaugurated his occupancy of the chair by the usual presidential address at the opening of the fifteenth session of the Institution, held at the Westminster Palace Hotel. Mr. Denny, from his comparative youth will find himself all the more *en rapport* with the rising generation of engineers, who form the bulk of the Institution, and in his address the President gave the members his best advice, gathered from his experience of the best training for an engineer as an apprentice, and many valuable hints as to the management of men and of a large engineering works and shipbuilding yard, such as that of his own firm. Mr. Denny fully commends the advantage to an apprentice of the most liberal education that he can get before commencing his practical work, but naturally would select an education comprising largely, mathematics, mechanics, and natural science, and with Latin and Greek cut down to a minimum. He considers the age of sixteen or seventeen sufficiently early for an apprenticeship to commence, presumably for those who have an ambition beyond that of becoming merely a skilful artizan. The drawing office is naturally the goal for those with brains, and a desire to use them, in either a shipbuilding or general engineering profession, though in marine engineering it is almost necessary for the budding engineer to have some years at sea, and to acquire his chief or extra chief's certificate before he can readily qualify as a good engine designer to meet the wants of sea-going steamers. He considers that premium apprentices are a serious detriment to works, as tending to affect discipline, and that both for the sake of the employers and for the apprentices themselves, all premium apprentices, if possible, should be bound by the same regulations as ordinary working apprentices. His advice as to the management of a large drawing office, including the keeping of a daily agenda or question book, were most valuable, and the following rule is a golden one for getting through work satisfactorily: "When several pieces of work appear equally important and it is a question which to tackle



first, choose the one you like least, and this once finished, the others will go down before you like corn to the scythe of the reaper." We are glad to see also that he impresses upon his hearers that to successfully carry on any business, engineering or otherwise, an engineer responsible for guiding such business must be a business man and have a full knowledge of items, not only of the prime cost in the way of materials and shop labour, which are the most obvious items, but also as regards carriage to and from the works, power supply, gas, repairs, maintenance, office and administrative and technical salaries. It is these general items beyond the obvious first prime cost that swallow up the apparent profit, and young engineers cannot too soon learn to appreciate that gross cost of production is composed of a large number of items besides material and workshop labour. If workmen could only be made to understand this there would, we think, be less cavil on their parts as to their share in the returns from any contract.

We should be glad if every shipbuilding and marine engineer and workman could read and inwardly digest an interesting paper communicated by William C. Jack, of Haiphong, to the Institution of Engineers and Shipbuilders of Hong Kong. The workmen would there see that in the far East, as nearer home on the Continent and elsewhere, shipbuilding and engineering industries are growing up, and under the skilled superintendence generally of British engineers and shipbuilders, are turning out magnificent work, so that for us at home to retain our foreign markets we must study cost of production, or the work will slip away from us. The British workman is apt, and with justice as to the foundation for his conclusion, to argue that he is worth, as a producer individually, a good deal more than any foreign rival, and therefore must, under any circumstances, retain the pre-eminence. This appears to be only true to a limited extent. It must be remembered that British foremen and managers can always be obtained, at a price, abroad to organize and train inferior individual workmanship, and on the testimony of Mr. Jack, who is manager of a shipbuilding and engineering establishment at Haiphong, the Chinese workmen may be made by proper organisation and direction to produce work better than home work in finish, workmanship, and durability. It is well known that the Chinese are most finished workmen in metal and carving, and in their own bamboo constructions, and can copy anything they see, so it is not incredible that with skilled oversight and training they may even rival our engineers and shipbuilders in mere mechanical production. It is admitted by Mr. Jack that no Chinese workman can

be considered equal in output, time for time, to a British workman, particularly in heavy work, but the relative scale of wages that will amply pay a Chinese workman does not amount to one-third of the ordinary wages at home. When the production of the Chinese workman, at his reduced wage, is balanced against that of the British workman, Mr. Jack finds by experience that there is an economy of 40 per cent. in workmen's wages in Haiphong as against home cost of labour, production for production. In all wood-work, too, the material is to be had better and cheaper on the spot than in England, and the native carpenter is more nearly equal to the British carpenter. The low depreciation also of native silver dollars in the East makes all payments of wages, and for material, locally in silver-using countries, to be to the advantage of native productions. Mr. Jack gives careful, detailed estimates of exact cost of a steamship of 1,000 tonnage gross, and finds that the cost, if built at Haiphong, is only 13s. 10d. per ton gross in excess of the lowest home prices, although he has from 10 per cent. to 25 per cent. additional cost on all exported materials for freight and dues, and also 100 per cent. excess for the skilled European management. This is almost entirely counterbalanced by deductions on wood, material, polishing and carving, and from 40 per cent. to 50 per cent. economy in workmen's wages paid. For the engines and boilers Mr. Jack puts the figures of local production at Haiphong as almost exactly equal to home prices at their lowest. When the cost of the outward journey, docking, overhauling, and sending home crews of vessels built in England for the East is considered, it is evident that there are many arguments in favour of local production of steamships, engines and boilers in the far East, and that evidently the present is no time, with a slightly brisker demand at home, to handicap the trade here by disputes which seriously hamper delivery and contracts, whatever may be the result of the unfortunate differences of opinion. Mr. Jack, of course, compiles his information for the benefit of the local shipowners, and local engineers and shipbuilders, and for neighbouring Governments and buyers in the East, for which we cannot blame him, as local interests are first for himself and friends, and there can have been no more forcible driving home of these facts to foreign buyers in the East than the disastrous spectacle of arrested production and bitter conflict in the North and in Belfast.

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**Thrasher.**—On November 4th Messrs. Laird Brothers, Birkenhead, launched the third of the 30-knot torpedo-boat destroyers for Her Majesty's Navy ordered in May last. She was named the *Thrasher* by Miss Eleanor B. Laird, daughter of the late Mr. Macgregor Laird, the African explorer of the Niger and its tributaries. Very rapid progress has been made with these vessels.

## INTERNAL FRICTION IN STEAM ENGINES.\*

By MR. WALTER WILLIAM HOUFE (MEMBER, HONG KONG).

(Concluded from page 318.)

3. Now this heat must be transmitted from the shoe's face just as rapidly as it generated, or it will become infinitely hot, and the condition that the transfer may take place is that the face must be hotter than at least some of the surrounding bodies. This transfer will be more rapid the greater the temperature differences. In this case the temperature of the surrounding bodies will be mainly governed by the ability of the surrounding atmosphere to dissipate heat, and this atmosphere is air, so the colder it is and the better its circulation, the lower will be the temperature of the shoe's face. From observation, this shoe's face is about 150 deg. F. when the temperature of the surrounding air is 110 deg. F., so that it appears that 37.62 heat units are dissipated by the air per minute for a difference in temperature of 40 deg. F. Had the surfaces become dry, the rate of generation would be about  $.209 \times \frac{.2}{.05} = .836$  per stroke,  $\times .836 \times 2 \times 90 = 150.48$  per

minute, and the temperature difference necessary for equilibrium to be arrived at would be such that the overheating of the shoe and guide would both be excessive and abrasion would have been taking place for some time. The particles of metal rubbed off or abraded would be so intensely hot that they would be rendered luminous, and their temperature would probably be considerably over 800 deg. F.

4. Again, had the surfaces had a plentiful supply of water administered to them, the heat generated per minute would have been in the shoe's face  $.209 \times \frac{.3}{.05} \times 2 \times 90 = 225.72$  units,

but as the water would absorb and carry the heat away very rapidly indeed, the temperature difference would be less than the 40 deg. stated previously, but although abrasion would not be taking place the wear would be greater than when the surfaces were oil in about the proportion of their co-efficients of friction, i.e., '3 : '05, or six times greater wet than when well oiled. If the surfaces, when well oiled, had been surrounded with an atmosphere saturated with water vapour, the temperature difference would have been less than 40 deg. F., for the rate of dissipation would have been greater than the rate of generation for such a temperature difference. This follows from the fact, as stated by Professor Rankine, that "The most rapid convection of heat is that which is effected by means of cloudy vapour, which combines the mobility of a gas with the comparatively greater conducting power of a liquid." Had the surrounding atmosphere been one of dry steam of the same temperature as the dry air, the temperature of the shoe would have been considerably less, for the relative specific heats of air and steam at constant pressure are respectively '2377 and '4806. A corresponding difference might also be expected for moist air and moist steam, which evidently would be somewhere intermediate between dry air and water and dry steam and water respectively.

5. Returning now to our steam-engine. The piston is fitted with a split ring which is a working fit between the junk ring and piston flange, but not a positively steam-tight one, so that a mean of the steam pressures obtaining in the cylinder may be expected to be continually pressing the ring outward on to the barrel face. This pressure will be  $\frac{1}{2} (143.9 + 68.9) = 106.4$  lbs. per square inch, allowing spring pressure of only 2.6 lbs. per square inch. The total outward load of the ring, which is 4 in. deep and 1 in. thick, will be approximately  $12' \pi \times 4 \times 109 = 16,437$  lbs. As this cylinder could not be considered as much else than dry so far as the piston path is concerned, the work expended in overcoming the frictional resistance per stroke will be  $16,437 \times 2 = 3,287.4$  ft. lbs., and the heat generated  $\frac{3,287.4}{778} = 4.62$  units per stroke.

In passing it may be well to note that if the surfaces over which this piston is passing be wet the frictional heat per stroke will be  $4.26 \times \frac{.3}{.2} = 6.39$  units. Of these 4.26 heat units, the ring surface has generated in it  $4.26 \times \frac{34}{38} = 3.8$  units per stroke. This

heat must be dissipated at the same rate, or the ring will become infinitely hot. It must be transferred by internal conduction in part to its other services and by external conduction to the cylinder barrel, junk ring and piston; from these surfaces the final vehicle will convey it. This final vehicle is the steam from which it was practically abstracted; for although the exhaust steam is colder than the steam on the other side of the piston, here the steam, for the greater part of the stroke at least, is super-saturated and water film probably plentiful. Had liquefaction been entirely prevented by superheating, or nearly so by jacketing, the rate of dissipation must have been enormously less, and consequently the temperature of the ring enormously greater.

Any attempt to mathematically investigate the probable temperature of any piston ring under working conditions would, I think, be futile. These temperatures might be readily ascertained, however, by means of small feasible plugs. As the rate of dissipation was 209 heat units per stroke from the shoe's face when running only at 40 deg. F. above the surrounding final dissipating medium (and before this rate could be increased fourfold the shoe fired became overheated), and although air cannot be supposed to be a better dissipator than steam, what but the water of condensation could have kept the ring from firing with its rate of generation five times greater than that of the shoe when overheating was excessive with it? Had liquefaction been entirely prevented in this engine, who could doubt but that the temperature difference of the ring and its final dissipating medium would have been so great that overheating and excessive abrasion would have been obtained? As it was, the ring ran fairly well, and so far as wear was concerned it was not greater than might have been expected. I think that it is beyond a doubt that this ring, like many others that are supposed to be fairly satisfactory to-day, was only permitted to run without excessive abrasion in consideration of its being kept comparatively cool by the copious liquefaction of steam obtaining, or by the internal water service obtaining.

It is interesting here to consider the piston friction in the same engine with a differently constructed piston ring and an efficient system of lubrication. Let the ring be solid (unsplit) of the same depth but with 3 in. of its bearing turned down a little, so that the bearing surface now is only  $\frac{1}{2}$  in. deep at each end, that is 1 in. effective (fig. 2 section). The ring being a tight fit exerts a pressure on the barrel face of say 3 lbs. per square inch. The load on the barrel face will be  $14 \pi \times 3 \times 1 = 132$  lbs. As the surfaces are well oiled, the frictional resistance will be  $132 \times .05 = 6.6$  lbs., and the work expended per stroke  $6.6 \times 2.5 = 16.5$  ft. lbs., equal to the generation of  $\frac{16.5}{772} = .0213$  heat units per stroke; of which

the ring surface takes up  $\cdot 0213 \times \frac{34}{35} = \cdot 0207$  units. This rate of generation is over 183 times less than obtained with the other ring and surely could be dissipated with superheated steam without much of a temperature difference, and consequently without abrasion, if the temperature to which superheating is carried be reasonable.

6. In present-day saturated steam engines, it is sometimes imagined that the heat generated by internal friction results in economy proper. As already set forth, the working steam will suffer but little loss in heat units from performing the work, for it is at once again converted into heat and absorbed by the working steam. The imaginary gain comes in—I think—in our way of stating steam consumption, viz., "steam per I.H.P. per hour," and the oversight of not deducting the power expended on internal friction from the I.H.P. We do not include the work expended on compression at the stroke ends, because it is work (heat) returned to the working steam. No more right have we to include the work expended on internal friction. In an average engine, the work expended on internal friction is said to be about 14 per cent. of the I.H.P., so that an engine developing 1,000 H.P. calculated in the usual way, would really be developing only 1,000  $(1 - .14) = 860$  approx. in virtue of heat abstracted from the steam. This, of course, would make a very considerable difference in her steam per I.H.P. per hour. In engines where liquefaction is entirely prevented, by some such means as superheating, the heat returned from internal friction will be absorbed more by the steam than is lost by the working steam, and even be available.

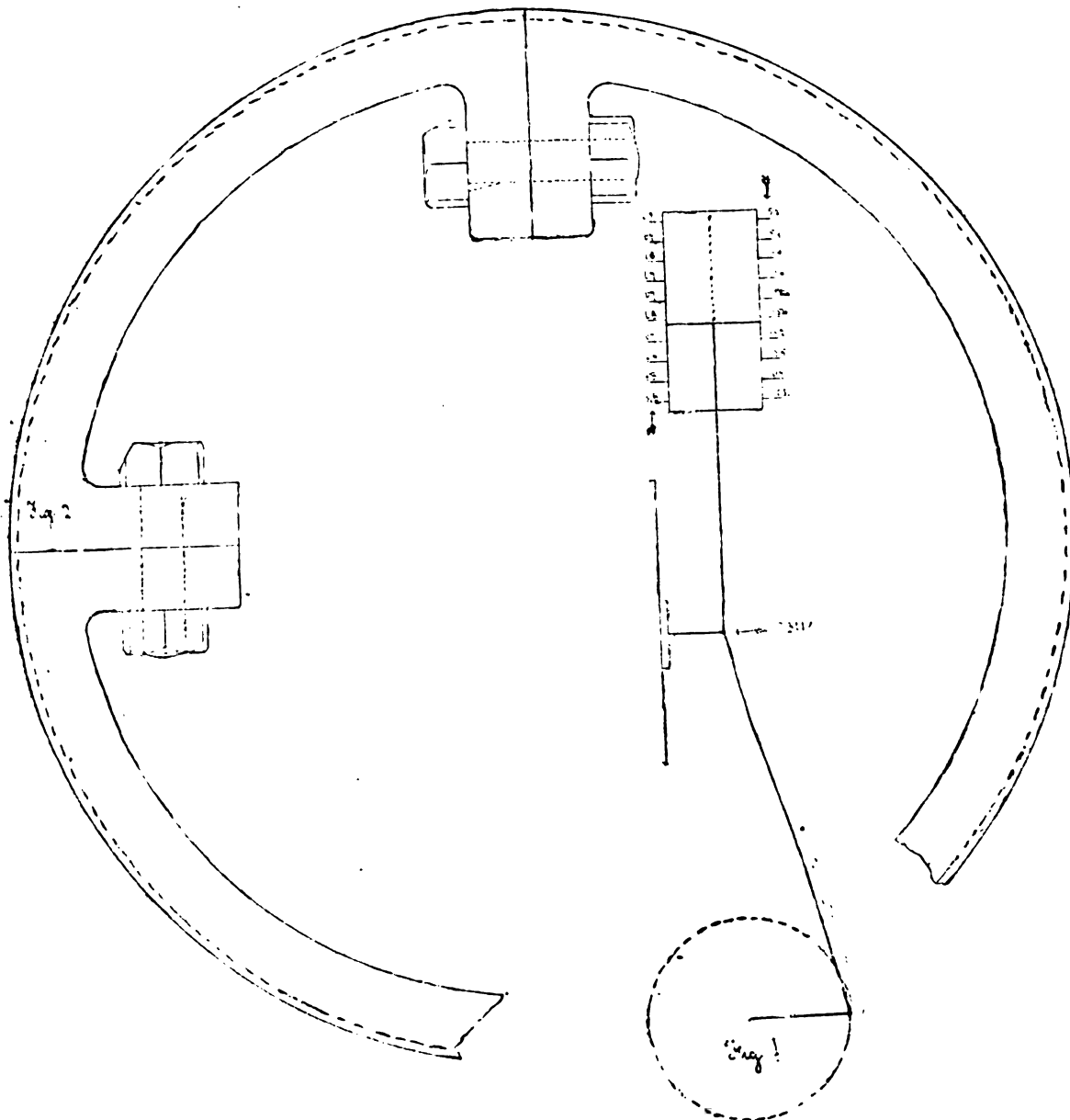
A. It is evident from the above that there is a gain in steam economy.

\* Read at the Institute of Marine Engineers, Romford Road, Stratford, on Monday, October 14th, 1895.

reduction less of the engine's I.H.P. will be absorbed internally; therefore, more would be available for performing the work for which the engine is intended. As friction is reduced so also is the wear, and in most existing engines the cost of upkeep might be considerably reduced by more attention being paid to the subject of this paper. That engines in which steam liquefaction does not obtain are the most economical steam consumers is beyond a doubt; and the best form of such an engine is evidently the superheated steam engine. As the drawback has

- (a) The piston and cylinder barrel;
- (b) The steam regulating valve or valves and the port faces;
- (c) The rods and their gland packings.

The most simple form of piston is the solid one, and if its rubbing surface is not deeper than necessary for practical steam-tightness it will afford the best advantages for minimum frictional resistance. To obtain practical steam-tightness it is generally held that a pressure of 3 lbs. per square inch is the necessary force with which the piston's rubbing surface must



hitherto been the abrasion of the internal rubbing surfaces, which was evidently due to their overheating through dry steam being a much less effective or rapid dissipator of heat than wet, by greatly reducing the rate of heat generation the superheated steam engine, I venture to say, will become a commercial success. This reduction must be attained by:—(1) Good design and upkeep of the moving parts. (2) Good lubricants and an efficient system of lubrication.

1. The internal parts which concern us here may be divided conveniently into three classes:—

press against the barrel's face. Hence, if 1 in. depth of rubbing surface be considered sufficient, as I certainly think it is, the frictional resistance of such a piston with surfaces well oiled would be for our 14 in. cylinder 6.6 lbs., as shown before. Such pistons, however, soon become leaky when the frictional resistance becomes concentrated and tends to become diam.  $\times$  effective depth,  $\times$  co-efficient of friction,  $\times$  mean absolute pressure of leaking steam, which in our 14 in. cylinder, with surfaces well oiled, would be 14 in.  $\times$  1  $\times$  .05  $\times$  108.4 = 74.48 lbs.

Local friction means local wear, and leakage means loss, so that obviously the upkeep of solid pistons is attended with much expense. In order to lessen the expense of upkeep and yet retain the advantages of a solid piston, solid rings can be fitted, and where the cylinder dimensions are sufficiently large these may be made adjustable, as shown in Fig. 2 (plan). These rings can be fitted so that the piston may be free to lateral motion with respect to the ring, the advantages of which are well understood. To obtain automatic adjustment of floating rings many patent piston packings have been introduced, but I do not know of any which even approaches the frictional advantages or is much less expensive in upkeep than such as is represented in Fig. 2. As it is outside the limits of this paper to do more than briefly discuss such packings, I have selected the Ramsbottom ring and Mr. Mudd's ring packing.

Ramsbottom rings are usually sprung into the recesses in the piston, but are sometimes fitted with solid ring distance pieces into the ordinary junk ring piston. They are of the split ring type, and their ends are often not even scarfed. That the steam accumulates behind them is evident, and when leakage at their joints or ends or flat surfaces becomes considerable the outward pressure of the ring on the cylinder barrel face will tend to vary with the steam pressures obtaining in the cylinder, thus causing the cylinder to wear into a varying bore. That this tendency will be increased with slow speeds and slack pistons is obvious. They should always be cut, drawn together with a band and then clamped on to the chuck's face to be turned to their finished size, as should be all other split rings. These rings are said to give satisfaction in small engines, especially in locomotive cylinders, where, of course, the stroke is small and the piston speed great. My own personal experience with them in marine engines is anything but favourable, and where deep ones have been fitted I have seen the cylinders worn very uniformly and rapidly. In my opinion, their greatest failings are that their surface load is so very liable to follow the varying steam pressures, and that it is far in excess of anything necessary for practical steam-tightness at its circumferential surface at all times. Three rings are commonly fitted, but I think two ample. The frictional work is considerable, and may be taken as a mean throughout as equal to diam.  $\times$  depth,  $\times$  number of rings,  $\times$  mean absolute pressure obtaining in the cylinder by the coefficient of friction, which in our 14 in. cylinder would have been  $14 \times \frac{1}{2} \times 3 \times 106.4 \times .05 = 850$  ft. lbs. per foot of travel, which is very considerable. As their surface contact with the piston is necessarily small, they are by no means suited for rapid transfer of heat.

Mr. Mudd's patent packing is of the double split ring type, having a number of steel springs placed in pockets acting between the two rings to keep them in practically steam-tight contact with the junk ring and piston flange, a sectional view of which is shown in Fig. 3. As may be seen from the fig. there is no outward spring pressure further than that due to the ring being sprung into the cylinder, as are all split rings. It is the only ring of this type that I know of that does not combine outward with the vertical spring pressure. These rings have a good section of metal and a good broad flat surface whereby the transfer of heat to the piston surfaces is facilitated. They are practically steam-tight at all their bearing surfaces, but the steam will, in a short time, surely search through to the space at their backs, and then their frictional resistance will become great, and in our 14 in. cylinder to about  $14 \times \frac{1}{2} \times 3 \times 106.4 \times .05 = 700$  lbs. roughly, but it will be constant. It is often advanced that steam pressure does not accumulate behind such rings, and that their flat surfaces are absolutely steam-tight against those of the junk ring and piston flange, although pressed together with no more force than admits of their easy lateral motion with respect to the piston. That this is impossible must be evident to all who have had anything to do with working faced steam joints. The condition for absolute steam-tightness is that the surfaces must be pressed together with sufficient force to compress the unavoidable irregularities into their own or opposite face, or partly both. This pressure will depend on the degree of smoothness of the surfaces and the compressibility of the metals. It may be well to remember here that if absolute smoothness were possible there would be no frictional resistance to motion between two bodies having such surfaces; but this condition of surfaces has never yet been attained. In practice we find it necessary for steam joints, &c., to allow a bolt section of about four times that necessary to

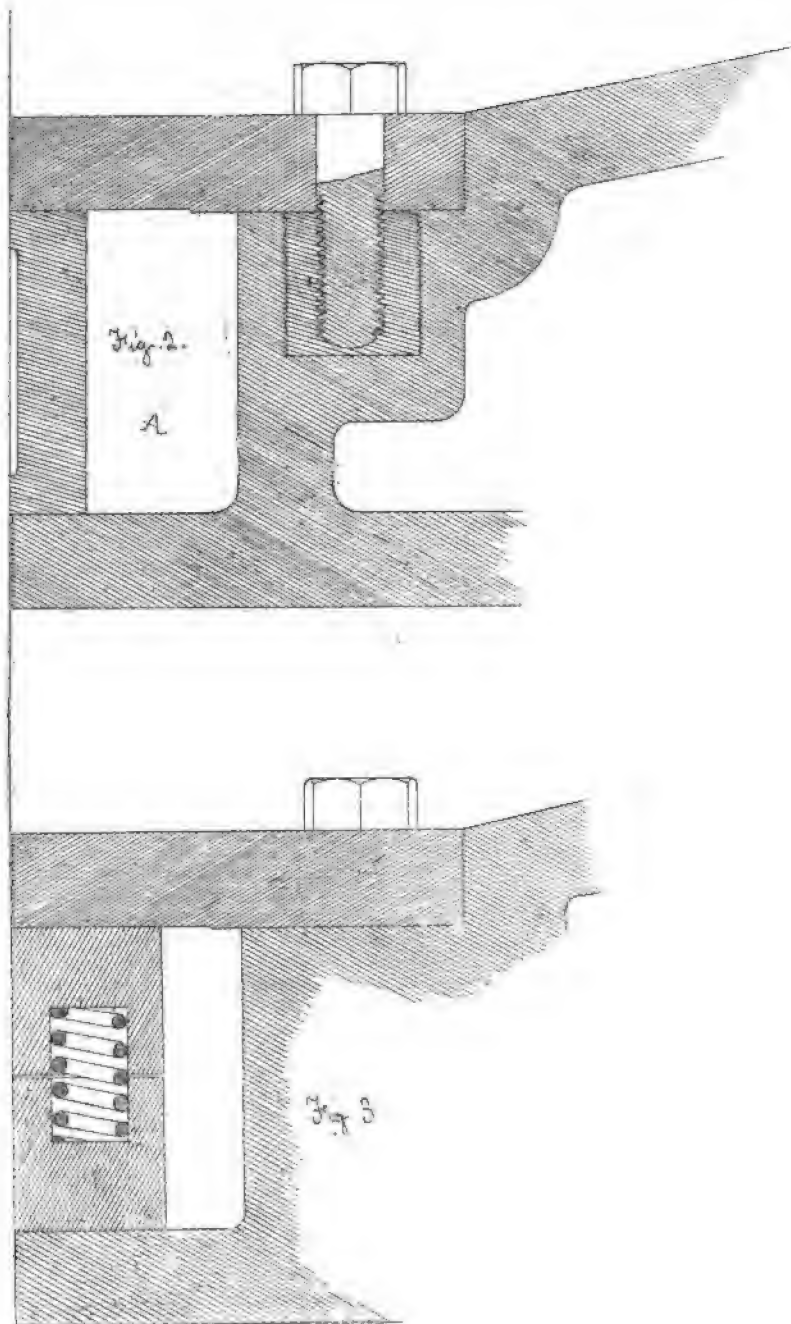
simply support the load due to the steam pressure on the pipe's sectional area. The extra bolt section is allowed to draw the metal surfaces hard together (to compress the irregularities). Even when these bolts are well tightened up, we should not be over confident of absolute steam-tightness without having painted, or put putty on, the faces. Since we find such a stress necessary in fixed faced joints, how can absolute steam-tightness be expected to obtain between faces of cast iron, which are, moreover, to be capable of easy relative motion. As already stated, practical steam-tightness is said to obtain between two metal surfaces when practically smooth with a pressure of 3 lbs. per square inch, so that to go intentionally much beyond this in piston ring faces seems to be unnecessary. What has been said I think is sufficient to warrant the statement that absolute steam-tightness between the junk ring, piston flange, and the packing rings, when they are to be capable of lateral motion, is a practical impossibility. Hence, where pistons are fitted with floating rings, steam pressure will accumulate behind them, but will be constant when practical steam-tightness obtains and equal to the mean absolute pressure obtaining in the cylinder. The larger the space A, Fig. 2, the less the variation with leaky flat surfaces. With split rings this pressure will increase the frictional resistance enormously, but with solid floating rings the increase will not be worthy of consideration, unless their thickness be ridiculously small. It is an advantage, however, to construct practically solid adjustable rings so that their bolts have initial tensional strain in them. I believe it is the result of experience that dissimilar metals run better together than similar ones often do, and as good results are obtainable with cast iron and hard cast steel, I suggest that cylinder barrels should be of cast iron, and piston rings of Whitworth's compressed cast steel. That cylinder barrel liners are better than the old solid cast style is self-evident.

B. Of slide valves we have many varieties, but with all of them frictional resistance is excessive, and in order to ascertain its amount in any given case, it is necessary to find the mean total face load throughout the engine's revolution. In order to do this, it will be necessary to find the effective load for, say, the twenty positions of the valve corresponding to the twenty indicator diagram ordinates, and then take their mean. The effective load for any given position is equal to the algebraical sum of the absolute pressures obtaining, with their proper signs attached,  $\times$  by their acting areas. Having found this mean effective load and denoting it by  $L_m$  the work expended on the valve's frictional resistance per revolution will be  $L_m \times \text{travel} \times 2 \times \pi$  (the co-efficient of friction). The smaller this result, the less the work expended, and consequently the less heat generated. Any reduction in steam consumption should render possible the reduction of the work expended on slide valve friction. Relief frames undoubtedly reduce the face load considerably, but since absolute steam-tightness between such surfaces is a practical impossibility, and experience has decided that they do not last long, even fairly steam-tight, they have been abandoned. The faced load under any working conditions is a continually varying one, not only as a whole but also on its respective ends. Due to this fact, slide valves usually hog, or become convex in direction of the r length. Piston valves are a decided improvement on slide valves, at least as far as frictional resistance is concerned. The only objection to them, I believe, is the room they take up and the increased clearance space and surface. Capital results are obtainable with this sort of valve, and where superheated steam is used, but few objections could be raised to the increased clearance space and surface. To economise space in such valves for large cylinders, double valves could be adopted either on the one spindle or otherwise. Much that has been said about cylinder pistons is equally applicable here, with the exception that it is necessary for considerations of steam regulation to have the circumferential surface flush (not turned away as in Fig. 2). Fig. 4 shows my idea of a piston valve ring, in section, which, when space permits, should be of the adjustable but practically solid type of Fig. 2 in plan. Having personally attended such a piston valve with an engine making very long runs, I have little hesitation in saying that such a valve might be run in reasonably superheated steam, with or without lubrication, but most certainly if a good oil and system of lubrication obtained. I suggest that these rings should also be made of Whitworth's compressed cast steel and the chambers of cast iron.

C. The gland packings in the market are most numerous, and may be divided into ~~two~~ ring packings and

textile packings. Hitherto, metal ring packings cannot be considered to have given much satisfaction. Most of them are constructed so as to allow of slight lateral motion of the rod with respect to the stuffing box: but this, I think, is not a necessity where floating piston rings are used, and the distance between the crosshead and gland is considerable. Alternate rings of white metal and brass of a right-angled triangle section

Canvas packings, such as Tuck's, are very good for moderate temperatures, and possess fair elasticity. "Lion metallic packing" appears to be a good combination of a textile packing with practically a metal rubbing face. It is, however, somewhat too rigid for small rod glands where the difference of diameters of rod and stuffing box is considerable. I have no doubt, however, but that it could be made of circular form in order to overcome



are often used. When properly attended to and put in with a couple of turns of good textile packing at the neck bush end it is fairly satisfactory. Textile packing should never be put at the gland end of such packings, for it will aid in the accumulation of steam pressure behind them and thus increase the friction. In probably all glands packed with floating ring packings, friction will be excessive. Textile packings have, so far, given the best results, and if good asbestos be used for hot steam glands, with proper attention, a practically steam-tight gland will obtain.

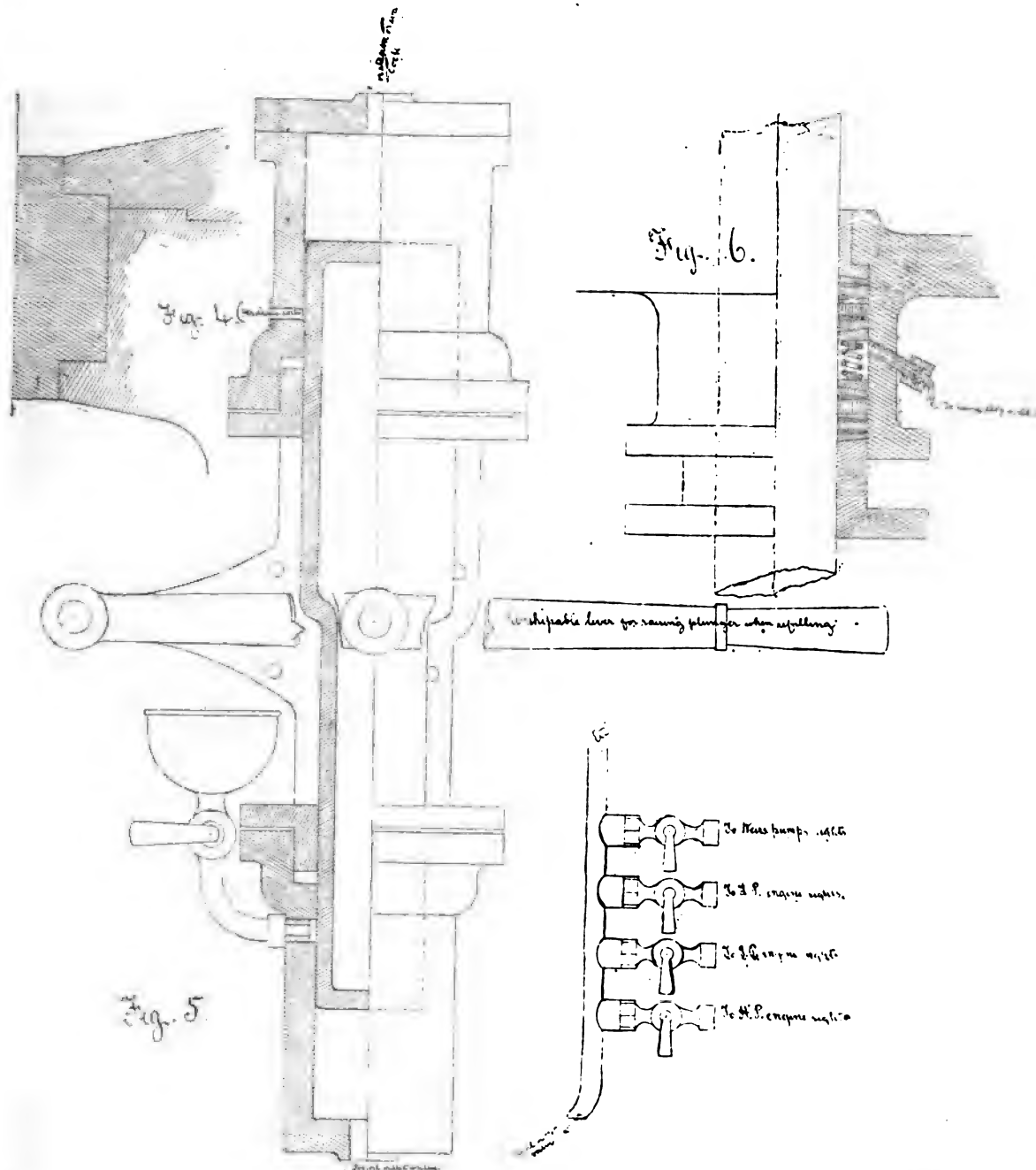
this objection. Having made long runs with H.P. glands packed with this packing, I can confidently say that, if properly attended to, it is capable of giving most satisfactory results. The friction with such packing, I think, need not exceed  $D \times W \times 3 \times 6 \times .05$ , which in a 7 in. rod gland would be roughly 19.8 ft. lbs. per foot of travel. As good asbestos packings expand considerably with moisture, they should never be put in too tight, or unnecessary friction will follow. I suggest that manufacturers of asbestos packings should tack a label denoting the



quality upon their packings, especially where several qualities of the same form are made, for I think packings are often condemned when they have been used for temperatures for which they were never intended. "Lion metallic" has the benefit of having only one quality.

2. That better so-called cylinder oils are in the market to-day than were when some of our older members were going to

steam, whether superheated or saturated, these temperatures must be considerably over 600 deg. F., as sperm oil did not fire till a temperature very much higher than this was arrived at, in the air, when of course the oxygen is free. I venture to suggest that an oil's flashing point cannot have much to do with its value in the steam engine, where free oxygen does not exist. Its boiling point under different conditions of surface pressure is



sea is unquestionable, and that at least some of them are lubricants in steam cylinders and valve chests at very high temperatures is beyond a doubt. I know from experience that Englebert's high-class cylinder oils retain some, if not all, of their lubricating properties in steam of 370 deg. F. How much above that temperature this and other good oils retain their lubricating properties I cannot say, but since reading the article entitled "Magnolia Metal and Anti-attrition Metal" in the MARINE ENGINEER of June, 1894, I have come to believe that in

what concerns us more. From these remarks and what has been said about water and steam as lubricants, I think it may be fairly concluded that internal lubrication in all engines is most desirable; in high pressure and low pressure engines whether using saturated or superheated steam. In the latter case (superheated) the best possible system should be adopted and the very best oils used.

The old-fashioned pot lubricators are obsolete and we have now automatic sight feed lubricators which may be classed

under two heads; the rising drop sight feed and the falling drop sight feed. The rising drop sight feed, such as that of Stephens & Struthers, must be placed below the cylinders, preferably on the lower platform, and the oil conducting pipe should be as vertical as possible, with no dipping bends in it and not less than  $\frac{1}{2}$  in. diameter. Its working depends on the fact that oil is lighter than water (volume for volume). I have seen this class of lubricator condemned when all that was the matter with it was that it had been placed above the cylinder level, and the conducting pipe being small, held water and so prevented the oil from dropping. The falling drop sight feed must be placed above the cylinder level, and a large section pipe is fitted to it, so that there is no water suspension in it; consequently this pipe, which should be vertical and without upturning bends, is full of steam. Its working depends on the fact that oil is heavier than steam (volume for volume). I know of a case where an engineer, wishing to have the drops of oil deposited in a certain spot, fitted a small internal pipe into a falling drop sight feed, the result being that the large section pipe became full of water, through which, of course, the oil would not fall; in consequence, the lubricator stopped working, but it resumed working again on the removal of this internal pipe.

Most sight feeds depend on steam condensation for oil displacement, but in most recent ones plunger or piston displacement obtains. These possess the great advantage of the force being considerable with which the oil is displaced, thus clogging is not liable to occur as in the case with water displacement ones. Reid's "Vulcan" lubricator is one of the best plunger displacement ones, but even these are open to objections, for since this lubricator works with a ratchet geared to the engine, as soon as the engine starts so does the lubricator, and should its extreme outlet cocks be shut the glasses or some other part must give way. Again, although the plunger stands still on reaching the bottom, the crossplate does not always do so, for I have seen one break across. No doubt this was due to the thrust bearing in the plunger being dry or dirty, thus allowing frictional resistance here to become greater than in the nut.

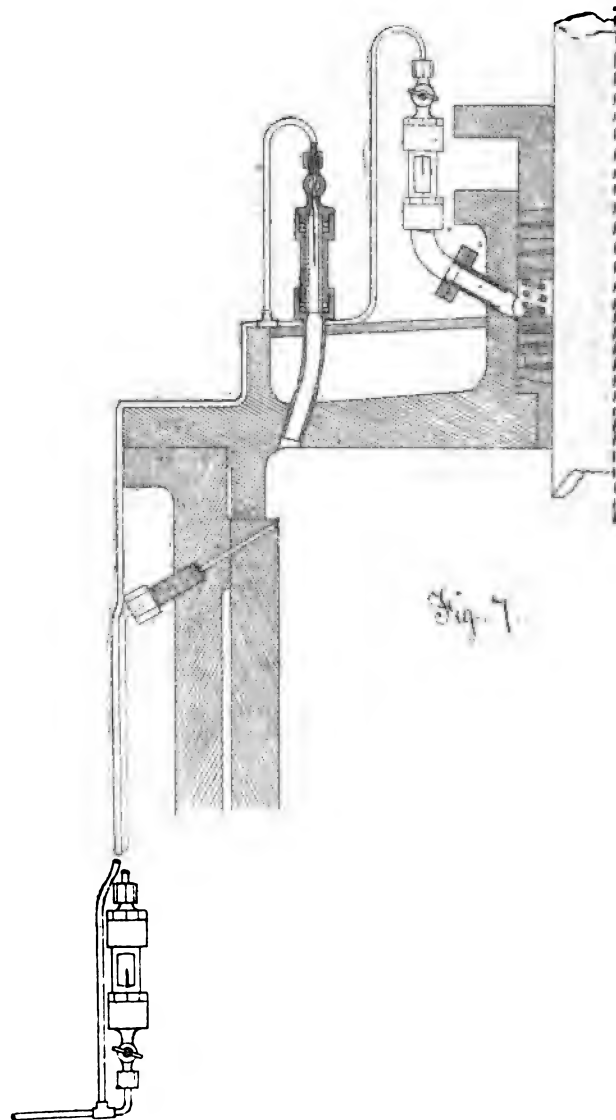
Sight feeds should be fitted not only to the main steam pipe or H.P. receiver but to each cylinder and steam chest and to all the glands. Such a statement as this I know will call forth much adverse discussion, for the tendency to-day is to stint oil internally to the lowest ebb. In fact, the whole of this paper tends to be adverse to general opinion, but as I believe its statements to be truths, I have not hesitated to place them before you to be reasonably approved or disapproved.

When it is accepted that on an average 14 per cent. of the I.H.P. is expended in overcoming internal frictional resistance and only 6 per cent. on external, knowing how elaborate is our system of external lubrication, is it not surprising that more attention has not been paid to internal lubrication? For an engine indicating 1,000 H.P. we use about three gallons of good oil externally and only about 1-20th to 1-30th of this quantity internally per day, then if the engines revolve without squeaking we imagine we are doing wonders. Had a good system of internal lubrication obtained, and about one-half to one gallon of good mineral oil been used, we should have had more power developed at the propeller and less wearing down of the internal working surfaces. That such a quantity of oil could be safely handled in the boilers by the scum valves and pipes, if properly fitted and used, I am confident. But since we live in the days of feed water filters no objections with any weight can be raised against an ample and efficient system of internal lubrication. In passing, I venture to remark that present feed-water filters are placed at the wrong side of the feed pump, and to suggest that instead of feed-water filters we want exhaust steam filters. It has been advanced that the rod swabbing supplies sufficient oil for internal lubrication. This may be so if there are sufficient rods and the oil be poured on at the tail ends. However, oiling should be done continually, and not by the feast and famine process.

I was present at the reading of Professor Lewis' paper on "Boiler Deposits," in 1891, and had the pleasure of seeing his experiment. In his proposals, however, he did not allude to discontinuance of internal lubrication, but such seems to be the tendency of marine engineers of to-day.

I cannot conclude this paper without alluding to the much quoted grunting in cylinders; but as so much space has been devoted to other subjects I must be brief on this point. Given a triple-expansion engine, fitted with (say) Mudd's piston rings and using saturated steam. If this engine is suddenly eased,

the steam will tend to become superheated, and this tendency will be greatest in the low-pressure engine. Though the steam passing through it may be lower in pressure it may be even higher in temperature, and in this state its ability to dissipate the heat generated by friction will be enormously reduced, while probably the rate of generation in the piston ring surface will be very slightly reduced; for since these rings are practically steam-tight the pressure having accumulated behind them will take considerable time to suffer much reduction, and may, conceivably, be for a time increased. Under such conditions the rings may become overheated, and the drag on the surfaces be such as



to cause vibratory motions such as we call grunting. In such an engine I have heard grunting, and seen the effect on the engines in consequence of the H.P. piston rings becoming overheated. This overheating occurred through the rate of heat dissipation being reduced by a hot piston rod. The cylinder was a barrel jacketed one, which jacket was promptly shut off and the gland slackened down. This practically turned the internal water service on, and cooled the rings, when the grunting ceased and the jacket valve was again opened. Grunting, as above alluded to, is due to overheating, and obviously with such engines this could not be imagined to occur when starting away slowly after a moderate warm up such as when leaving port. Neither will it be likely to occur on entering port if the steam pressure be allowed to fall steadily and the engines be allowed practically to slow themselves. Grunting may conceivably occur in a slow

running engine where the rings' frictional resistance is but small (especially with deep rings of light section) from this resistance being alternately that of rest and motion, thus setting up vibratory motions like chattering and grunting. If the coefficient of friction increases as such alterations in speed are made, so will additional reason be added to my views.

Not being satisfied with any of the existing sight feed lubricators, I have drawn one which is more to my mind and marked it Fig. 5. It is intended that the difference in the sectional areas of the plunger shall be such that the oil pressure at the regulating valves will be considerably in excess of the greatest steam pressure obtaining in any of the engines which the sight feed lubricator is to supply. This pressure will also be constant under all conditions, and for all conditions of working. It is easily filled and requires the minimum of attention. It should be placed near the starting handles, so that all or any of its branches can be readily shut or opened by the engineer. What has been said about the "rising drop" and the "falling drop" sights must, of course, be observed in planning any required arrangement of distribution. Fig. 6 shows an arrangement for lubricating glands. Fig. 7 shows my idea of applying either the falling drop or the rising drop arrangement to cylinders and valve chests. To save long lengths of pipe, necessarily of large section for the falling drop arrangement, the sight must be placed close to the spot where the attachment is made. All glands should have at least one sight supply, cylinders two; valves, if of piston type, one; if of common slide, two; donkey engines, etc., one. Of course, the more there are to any part, the less may be the supply through each, but the more efficient will be the system.

In conclusion, I venture to say that if the *Magellan* had been fitted with pistons, piston valves, packings, and a good system of lubrication, as alluded to in this paper, with feed or exhaust steam filters and saturated steam as a stand by water service, she would not have been a terror to her engineers, and the superheated steam engine would long since have superseded the saturated steam engine. Since it has taken so long to reduce the one-time absolute necessity of an external water service, the internal water service of saturated steam should be fitted to superheated steam engines.

A meeting of the Institute of Marine Engineers was held on October 28th, at the Institute premises, 58, Romford Road, Stratford, when the subject of discussion was the paper by Mr. W. W. Houfe, read at the previous meeting, on "Internal Friction in Steam Engines." Mr. T. F. Auckland presided.

Mr. Ruthven, who re-opened the discussion, called special attention to the pressures that should be put on piston rings. The author considered that the piston's rubbing surface should press against the barrel's face with a pressure of 3 lbs. per square inch. It would be interesting to hear the views and experience of other members on this point.

Mr. J. T. Smith, believed that the moderate and regular use of oil for internal lubrication was really a source of great economy, but only oil of very superior quality should be used.

Mr. Kirkwood, speaking from his own experience, considered that, under ordinary circumstances, the less oil used the better. Much depended on the type of piston and piston ring in use, and a good deal on the metal of which the cylinder was composed.

Mr. H. C. Wilson said that internal friction might be greatly reduced or increased by a careful adjustment or otherwise of the internal moving parts. It had always appeared to him to be almost a practical impossibility to estimate, with any degree of certainty, the amount of pressure put upon the barrel of the cylinder by screwing down the junk ring bolt of the piston. The present practice of internal lubrication seemed to be a compromise between the claims of the boiler and the engine, and for his own part, if he could make sure of intercepting this oil, and preventing any of it from reaching the boiler, he should certainly make more use of it, especially with compound engines.

Mr. James Adamson said that, when the paper was being read, it struck him that the design of the valve in the case of the steamer referred to by Mr. Houfe was probably more the cause of the trouble than the 75 lbs. pressure of steam. He was acquainted with a steamer that was fitted with an inferior design of valve, and the faces of the valve and cylinder were cut to a considerable extent. That steamer had to have her valve faces renewed very frequently. A new design of valve was afterwards fitted, and thenceforth she did not give the least trouble for five or six years. He thought the blame for trouble of this

kind was often put upon the steam, when it was really due to the design of the valve or gear. Instead of resorting to the use of more oil, he suggested that they should seek a remedy for much of the frictional trouble by studying the questions of design and of the fittest metal of which to construct the piston and cylinder barrel.

Mr. Leask, an expert with regard to oils, was of opinion that the best oil for high pressure engines was a pure hydro-carbon with very high running qualities. A pure hydro-carbon oil would never in any case produce acids that would act detrimentally upon iron.

Mr. J. B. Johnston urged the fallacy of using oils for internal lubrication. The rubbing surface to be lubricated was so large that in an engine exerting, say, 3,000 I.H.P., three gallons of oil in 24 hours would only work out to the millionth part of a drop on the infinitesimal part of a square inch per revolution of effective lubrication.

A vote of thanks was accorded to the chairman and the discussion was adjourned.

It was resumed on November 11th, when the President of the Institute (Mr. A. J. Durston, C.B., R.N.) occupied the chair.

Mr. Leask, re-opening the discussion, said that one gentleman at the last meeting, arguing against the use of cylinder oil, said that in the case of a 3,000 I.H.P. engine, oiled with three gallons of cylinder oil per 24 hours, it would only work out to the millionth part of a drop on the infinitesimal part of a square inch per revolution, probably all that was meant was that a drop of oil spread over the entire cylinder surface gave a very thin film. If so, he did not think it met the case. A good cylinder oil, as experiments had proved, would not be dissipated at once by the heat of the steam. From their very constitution tallow and most animal and mineral oils were open to the objection that they were liable to decompose, and their fatty acids to form iron and other soaps insoluble in water. Hydro-carbon oils, whether of the paraffin series or of the olefine series, were not open to the same objection. After referring in some detail to a number of experiments as to the comparative lubricating effects of different oils, Mr. Leask concluded by saying that the lightest oil that would keep the surfaces separate was the best, other conditions of suitability being present, extra viscosity meaning extra friction.

The Honorary Secretary read a communication from Mr. John H. Thomson (chairman of Council) with reference to the engines of two steamers instanced by Mr. Houfe. Messrs. Duncan, Sage, Murphy, Greer, Ruthven, and Johnston also spoke, and Mr. Leask explained the construction and working of an apparatus which he exhibited for testing oils.

The President (Mr. A. J. Durston, C.B., R.N.) said he thought they were very much indebted to Mr. Leask for the information he had given them with regard to mineral and other oils. The subject of oils was a very intricate one, and he was sure that Mr. Leask himself would agree that if they were mixing oils it was very difficult to say how much there was of one kind and how much of another. The Admiralty practice was to issue tenders for marketable oils—for external lubrication, rape or olive oil, for internal lubrication pure mineral oil, and for lighting rape oil. Of course, when it was convenient, castor oil was used in the East, when it was conveniently obtainable, and when the general temperature was such as to admit of its use. The question of filtered oil was a very interesting one, and the results obtained from filtered oil were very remarkable. He had only just had time to read the paper, but there was a great deal in it, and, if it was not irregular, he would like to send in a few remarks in writing on the various points referred to. He agreed with some of the gentlemen who had spoken that Ramsbottom rings well fitted served them well, and so did split rings. Mr. Houfe recommended a solid ring set out with liners. Well, they had this and there was one thing to be said about it. If they got any solid matter in the cylinder, it was a bad job for both piston and cylinder. There was no giving way of a solid ring. Then again it was true, at least in his experience, that cast-iron was a very good material for internal working. A few years ago they used to have steel liners for their cylinders, but they had gone back to cast-iron, and cast-iron liners and cast-iron rings were as good as they could have for the purpose.

If Mr. Houfe's favourite plan of fitting steel rings were adopted, he was afraid they would often have the splitting of cylinders taking place. With cast-iron rings and steel liners he had seen them put into the steel liners in

places, and when it did this it formed a substance which there was no getting rid of except with a piece of oilstone. Mr. Houfe spoke about internal lubrication, and, quoting Rankine as his authority, said that water was an anti-lubricant. All that Rankine said was that there was a greater amount of friction with water than with oil. But it appeared to him (Mr. Durston) that there was another friction which water and steam carried out in the engines. A very small quantity of lubricant now went into the cylinders, for their general experience had shown them that a little swabbing of the piston rods and slide valves was all that was necessary in most cases. Even in the torpedo-boat destroyers every oil-cup was done away with. The oil that went into the cylinders went in with the piston rods, and yet a great deal got in, very often much more than they wished. Well, the small quantity of lubricant that went into the cylinders was very well distributed over the surfaces by the minute division of the water and steam. Every particle of water and steam carried with it an infinitesimal quantity of the lubricant. Of course, if, as Mr. Houfe very pertinently remarked, they could have a filter that would separate the oil completely in the exhaust passage, it would be a very great thing. It would be in every way a great advantage if they could trap the whole of the oil in the exhaust passage, and they could then keep up a plentiful supply of oil round the engines without doing any damage. But they had not yet arrived at that stage, and it could not be disputed that the general result of using large quantities of mineral oil was to bring their boilers to grief. It would certainly be a very desirable thing if, as Mr. Houfe had suggested, superheaters could be again used. The superheating of former days was carried out under greater difficulties than were experienced now, and they now knew much more about the materials employed and plans for regulating the superheating of steam. Frequently there used to be very little control over the superheating, but where superheating was used with judgment, as far as it went, it led in very many cases to increased efficiency. He suggested that they accord Mr. Houfe a hearty vote of thanks for his exhaustive paper, which bore evidence that the author had devoted a great amount of thought and work to the subject. The proposed vote of thanks was at once agreed to.

The Honorary Secretary announced a paper on "Water-tube Boilers" for November 25th, and reminded members of the annual *conversazione* to be held at Stratford Town Hall on Dec. 6th. The meeting concluded with a hearty vote of thanks to Mr. Durston for his presence and address.

### THE "EVOY JUMPER-STAY" COMPASS.

WE have pleasure in herewith illustrating an ingenious, and, from the many eulogistic testimonials that have been submitted to us, we should say very successful, form of standardising compass, the sole rights in connection with which have been taken over and supplied wholesale by Messrs. Heath & Co., Limited, the well-known scientific instrument makers, of the Observatory Works, Crayford, London, S.E.

The Evoy ("Heave-a-hoy"), consists of an improved form of spirit compass, so designed and constructed as to allow of its being hoisted sufficiently high aloft as to place it quite beyond the range of any local or induced magnetic lines of force due to the metallic construction of the vessel or its cargo, the mechanism being so arranged as to ensure that while the card swings absolutely free of all inductive influence when aloft, the first effort to haul the compass down instantly locks the card in place, and as it is not again freed the magnetically uninfluenced reading so obtained is brought down to the bridge, or deck, level, when comparison with, and correction of, the ordinary steering compass is readily and accurately made.

As will be seen from the accompanying illustrations,

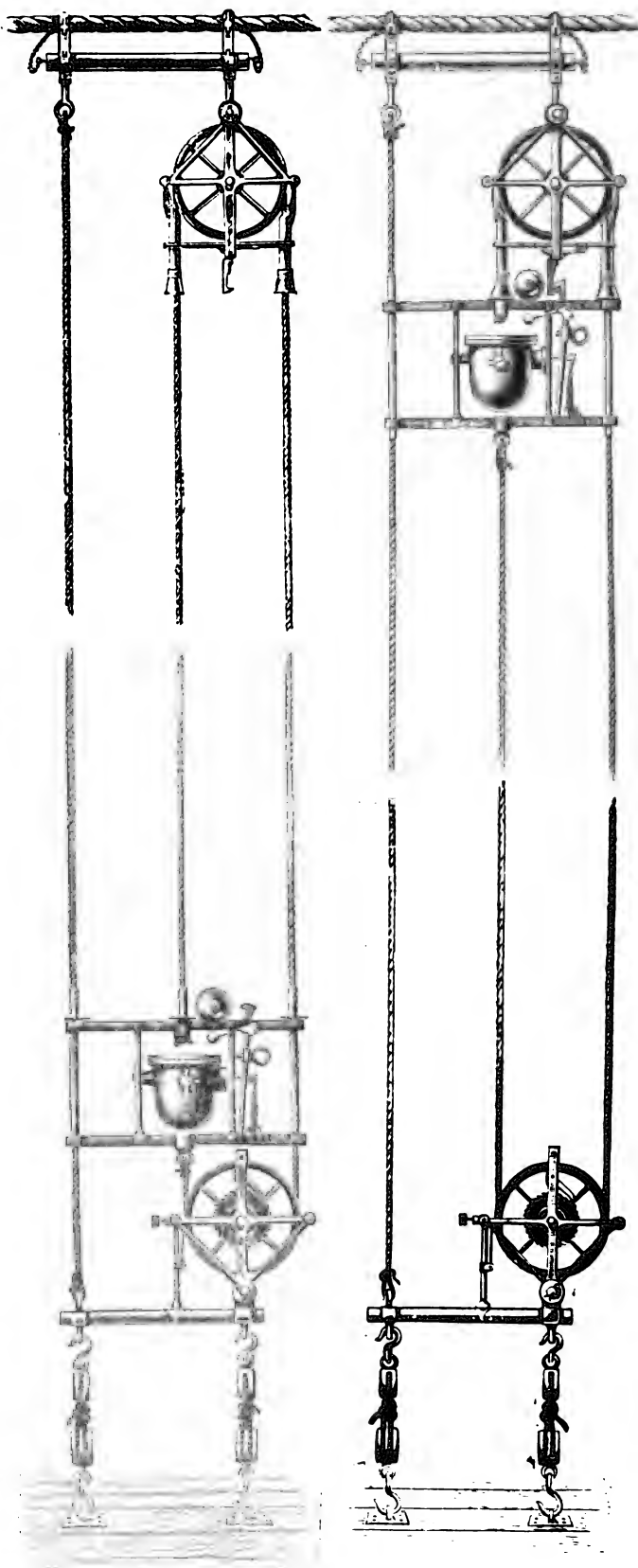


FIG. 1.

FIG. 2.

a jumper-stay running fore and aft from topgallant-mast-head to topgallant-mast-head has tackle rove from it, and secured to the deck in the manner shown. In its normal position the compass is down and locked as in Fig. 1. When it is desired to take a reading the card is unlocked, by pulling back a trigger on the fore side of the bowl, and the cross frame containing the compass run aloft as shown in Fig. 2. About three minutes suffices for the card to take up its correct magnetic position, after which the vessel is kept steady on her course and, if rolling, a moment is selected when she is upright to haul the compass down to the bridge, as Fig. 1.

The first pull of the hauling-down motion automatically liberates the internal locking gear, thereby clamping the card in its then position, and simultaneously causes the bell to ring aloft. The reading of the overhead compass, when so clamped and hauled down, is then compared with that which the standard steering compass showed at the moment the bell rang, and the difference, if any, is the deviation of the latter compass correctly ascertained apart from the aid of sun, moon, or stars, and as readily and accurately obtained during thick or foggy weather as in the brightest light.

The use of this compass ensures amongst others the following advantages: A correct magnetic course is always ascertainable regardless of the state of the weather or even during a dark night, and apart from azimuths, bearings, or calculations of any kind. As the compass is entirely removed from all metallic influence there can be no deviation. The compass is correct in any latitude. A direct reading is taken on bridge or deck, without the aid of any, only too frequently moisture-dulled, glasses or reflectors. It is less expensive and more reliable than pole or mast-head compasses, which in several lines of steamers it has superseded.

Among recent patrons we may mention the s.s. *St. Louis*, and s.s. *Paris*, of the American line; four vessels of the General Steam Navigation Co.; the whole of the fleet of the Nautilus Co., of Sunderland; the Union R.M.S. *Tartar* (the master of which speaks in the highest terms of praise of this compass); the *City of Vienna*, of the City Line of Glasgow, several steam yachts and many other well-known vessels are fitted and fitting with it.

## THE INSTITUTION OF CIVIL ENGINEERS.

THE first meeting of the session 1895-96 was held on Tuesday, November 12th, when a portion of the new building, comprising the theatre and approaches, with tea-room, &c., was made available for the purposes of the evening. The chair was taken at eight o'clock by Sir Benjamin Baker, K.C.M.G., LL.D., F.R.S., the new President, who delivered his inaugural address. After some preliminary observations referring to the position of the Institution in the domain of engineering, and the necessity of British engineers acting together in a true spirit of comradeship throughout the world, the President proceeded to discuss the question why engineering, unlike other liberal arts, was an essentially modern profession. Was it because the modern demand for rapid transit, often as purposeless as that of a record-breaking bicyclist, had not its equivalent in the past, or was it because our ancestors lacked the inventive power and mechanical ingenuity of the present age? The artificers who built the highly-ornamental barge in which Columbus blundered across the Atlantic could, with the same materials and workmanship, have constructed a clipper

ship capable of sailing 300 miles in a day, but no one asked for speed in those days. On the other hand, although the present was pre-eminently an age of invention, an impartial survey of actions and events recorded in history would satisfy most people that in all ages there were to be found men no less intellectual and enterprising than ourselves. The general answer to the question raised would probably be that as it was only in the present century that people had insisted upon rapid locomotion by land and water, so it was the necessity of meeting that demand which had created the profession of modern engineering. When Watt directed his attention to the steam engine, the country was weary of wars, and longed for the advancement of its material prosperity, and so a demand was created, and the country quickly became covered with canals, roads and factories. At that time England depended largely upon her American colonies (now the United States) for the supply of iron, and in 1751 an Act was passed admitting American bar iron duty free to London, but prohibiting its cartage therefrom to Birmingham, as it was desired to make London, instead of Birmingham, the chief seat of the iron manufacture of the country. No one foresaw that Great Britain was to become the leading iron-producing country of the world. On all subjects, indeed, the most eminent men constantly failed in their forecasts. Smeaton did not believe in the steam-engine as proposed by Watt; Telford had grave doubts as to the practicability or usefulness of the Liverpool and Manchester Railway; Sir Robert Peel, sixty years ago, blocked a proposal in Parliament to make all the railways seeking access to London adopt a comprehensive plan for a central exchange station, so that through passengers and mails might be saved cabbings across London; Lord Brougham tried in 1857 to make 30 miles an hour the statutory limit of speed on railways; Lord Palmerston told the House of Commons that the Suez Canal was one of those bubble schemes often set on foot to rob the English capitalist, and even Robert Stephenson, following him, declared it to be, commercially speaking, impracticable. All these mistakes, however, became insignificant when contrasted with the gigantic blunder, acquiesced in by the whole civilized world, of assuming, at the time of the Great Exhibition of 1851, that the efforts of the engineer would effect an immediate change in the long inherent savagery of mankind, thereby inaugurating a period of universal brotherhood and peace. Civil Engineers were often reproached for devoting their ingenuity to the devising of man-killing appliances, but with little reason, for no one could fail to see that whatever might be the abstract principles of Christianity, in practical politics they were disregarded, it being always taken for granted that if a nation possessed that which another nation might covet, it must be prepared to defend its possession at the point of the sword.

It had been frequently assumed that everyone acknowledged the benefits conferred upon humanity by engineers in facilitating communication, cheapening production and raising the condition of the toiler; but the late Professor Froude had publicly stated that he failed to see much evidence of progress in the nature of men, and that "Even in the outward essentials of food and clothing and housing it is not certain that the mass of mankind in the present generation are better off than their forefathers." The president was not prepared to accept this dictum, and maintained, on the contrary, that the mass of mankind were much better off than their forefathers in these respects. Further, that the independence of the labourer and mechanic had been greatly advanced in consequence of the vastly increased demand upon their services due to engineering work. In support of this view, it was stated that as recently as four years after the opening of the Liverpool and Manchester Railway, certain Dorsetshire labourers ventured to erect themselves into an elementary form of trade union, and were sentenced to seven years' penal servitude for their pains. At the present time many municipal contracts provided for payment of wages at trade-union rates, whereas a couple of centuries ago, the magistrates fixed the rate at Quarter Sessions, according to the price of food and clothing, the average being about 1s. a day for carpenters and masons, and 8d. for labourers. The hours of labour for all classes were from 5 a.m. to 8 p.m. with 2½ hours interval for meals and rest. The penalty of an employer who departed from these regulations was ten days' imprisonment and £5 fine, and for a workman twenty-one days' imprisonment. No man in search of work could beg without a license, the statutory penalty for a first offence being whipping at a cart's tail, while the second offence meant the loss of an ear and two days' scourging.



the third hanging. On the whole, the study of the past was conclusive as to the material and moral progress which had accompanied the development of engineering works.

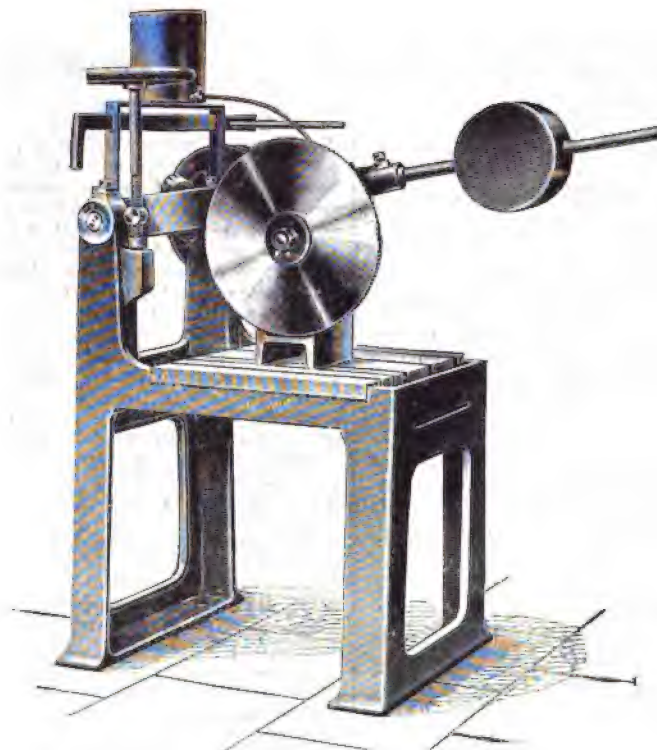
The President next dwelt upon the work done by physicists in the borderland of engineering, and expressed the opinion that long before the coalfields were exhausted some way would have been discovered of tapping the inconceivably great reservoirs of force in nature still untouched. Although no one could foresee the demands of the next age, new wants constantly arose, and new branches of engineering often resulted from apparently trivial laboratory experiments.

In conclusion, the President sounded a note of warning against the growing disposition to overrate technical education. Education would do much, but it would not endow a man with common-sense, nor would it make his opinion on a multitude of important subjects worth more than that of any naturally observant person. There were not wanting contractors and manufacturers who contended that some of the

## ATKINSON & LEATHERS' COLD SAWING MACHINE.

WE are indebted to the manufacturers, Messrs. Atkinson & Leathers, of the Bennett Street Ironworks, Ardwick, Manchester, for the accompanying illustration of, and sample sections cut by, an improved form of cold sawing machine they are now putting on the market.

The machine is compact, open, and easily handled, and is throughout constructed of the best materials and with the best of workmanship. It will cut, leaving a square, clean finish, 4 in. round or square bars or angles, channels or girder sections up to 9 in. by



highly-trained young engineers of the present day were not wholly free from a tendency to over-much reliance on formulas, without due regard to the sufficiency of the data upon which such formulas were based. Such faults were best remedied by joining in practical discussions with other engineers, such as it was a province of the Institution of Civil Engineers to encourage.

After the delivery of the address, the president presented to the recipients or their representatives, the medals and premiums awarded for papers read last session or printed in Section II. of the Minutes of Proceedings.

**A Fast Cruiser.**—The French Government has contracted with a private French shipyard for the building of a fast cruiser, *Chateau Renault*, which is to be fitted with three propellers, and the engines of which are to have a capacity of 23,000 H.P. The displacement will be about 8,000 tons and the maximum speed 23 knots.

**Virago.**—On November 19th Messrs. Laird Brothers, Birkenhead, launched the fourth of their torpedo-boat destroyers for the British Fleet. The vessel was named the *Virago* by Miss Eva Bevis. The *Quail*, the first of these vessels, begun in May last, is expected to be under steam before the end of the year.

4 in., and should prove a most useful addition to a boiler or engine shop, or shipyard.

It does not require skilled labour to operate it, as when the work is set very little attention is required, and as the work is fixed and cut much quicker than it can be done by the smith, a great saving of time is effected—in fact, such a machine should soon pay for itself in a busy shop.

Briefly the machine may be said to consist of a cast-iron table provided with the necessary T slots for securing the work, and mounted on feet, as shown, to a convenient working height.

The lever frame, swinging on dead centre bushes, is provided with an adjustable feed for use when cutting thin metals, and carries a 15-in. saw blade capable of cutting cold iron or steel. The saw blade is carried by a steel spindle, and driven by a gun-metal worm wheel and worm actuated by steel shafts, and 12-in. driving pulleys speeded to 240 revolutions.

The saw is sent out complete with fast and loose

pulleys, strap striking gear, water pot, and the necessary screw spanners, and can, if desired, be fitted with a 5-in. swivel jaw vice for holding straight or taper work.

From figures now before us the tool appears to be supplied at a very reasonable price, while its general utility is unquestionable.

## LAUNCH OF H.M.S. "JUNO" AT BARROW.

ON November 16th, in a deluge of rain, H.M.S. *Juno*, one of the two second-class cruisers building for the Admiralty at Barrow, was successfully launched by Lady Evelyn Cavendish, wife of Mr. Victor Cavendish, M.P. The following is a description of the vessel. Principal dimensions:—Length, between perpendiculars, 350 ft.; breadth, extreme, 54 ft.; draught, 24 ft. 6 in., and her displacement when fully equipped for sea, 5,600 tons. The hull is constructed throughout of steel, and the framing is the usual style adopted in warship construction.

The double-bottom extends for the length of machinery spaces, but the watertight flats to magazines and shell-rooms practically extend the double-bottom well towards the forward and after ends of the vessel; and all well subdivided into watertight compartments.

The hull is fitted with numerous watertight longitudinal and transverse bulkheads, which, while imparting considerable strength, greatly minimize the risk consequent on damage in action or otherwise by localising the effects due to any of the compartments becoming flooded.

The vessel being intended for long cruises and foreign service, in which the maintenance of uniform speed is essential, has been completely sheathed with teak to well above the load line, and coppered.

To secure steadiness of gun platform, so necessary for a vessel for war purposes, bilge keels have been fitted.

The stem, stern post and rudder are of phosphor bronze, all made and completed at the company's works.

The protection of the vessel consists of a strongly built protective deck extending the whole length of the vessel, affording protection to the vital parts, such as magazines, shell-rooms, machinery, &c.; the engines being further protected by a sloping Harvey-armoured citadel. The reserve coal bunkers are on the protective deck over the engines and boilers, and whilst affording a water-line belt of coal protection they (being subdivided into watertight compartments) give additional security in the event of damage.

The vessel has bunker capacity for about 1,000 tons coal. She has a ram stem, and the structure behind is specially strong and efficiently connected to the framework of the ship, with a view to the contingency of ramming.

An armoured conning tower of Harveyised steel is placed forward, fitted up with the usual means of navigating the vessel and directing operations whilst in action, the whole of the connections for which are protected by an armoured tube extending to the protective deck.

An additional director tower is also provided at the after end of the vessel. Conning bridges are fitted forward and aft on top of these conning towers for navigating purposes. Three search lights are operated from these bridges. The after shelter deck and forecabin will be connected by a fore-and-aft bridge, and the boat and general equipment and accommodation will be of a very complete character. The ship has two steel masts, fitted with military tops for working machine guns, and rigged with fore-and-aft steadying sails. A signal yard is fitted on both masts. The vessel will be ventilated by natural means above protective deck and below it by fans electrically driven, in addition to the natural means.

The pumping, flooding, and draining arrangements are very complete and so arranged that each service is generally duplicated.

The ship will be lighted throughout by the electric light.

The accommodation for the officers and crew is of an ample nature, the latest fittings being provided. The total complement of officers and men will be 450.

The armament will consist of five 6-in., six 4.7-in., nine 12-pounder guns, and seven 3-pounder quick-firing guns; also four 45 Maxim machine guns.

The torpedo arrangements will consist of two submerged torpedo tubes forward, and one above-water torpedo tube aft, all capable of working the latest pattern torpedo.

The following is a description of the machinery:—

There are two sets of inverted direct-acting engines, fitted in separate watertight compartments, having cylinders 33 in., 49 in. and 74 in. diameter respectively for the high, intermediate and low, the stroke being 39 in. The high pressure cylinders are fitted with piston valves, the other cylinders having double ported slide valves actuated by means of the ordinary link motion and having balance pistons and relief rings to reduce the load on the gear. The crankshafts are made in three interchangeable pins, bored hollow and having large bearing surfaces. The main bearing frames are of cast steel secured together by cast steel girders so as to form one complete bedplate for each engine. The back columns are of the usual inverted V form having the crosshead girders attached to them. The front pillars are of wrought steel strongly braced together by means of horizontal and diagonal stays. The air pumps are driven by means of levers from the high-pressure crosshead, and are arranged to deliver through filter tanks into the main feed tanks. The collective I.H.P. of the two sets of engines will be 9,600 when running at 140 revolutions per minute with 150 lbs. steam pressure in the boilers. The main condensers are cylindrical in form, built of naval brass and having a total cooling surface in the tubes of 10,600 square feet. Auxiliary condensers are also provided for condensing the steam from all the auxiliary engines throughout the ship, and in connection with these condensers, independent air and circulating pumps are fitted. The main condensers have two large centrifugal circulating pumps in connection with them, which are also arranged to pump from the bilge in the event of a leak in the hull of the ship. The other auxiliary machinery in the engine-rooms consists of four fire and bilge pumps, two hand pumps adapted to be driven by the main engines, a drain tank pump, two dynamos and engines, two sets of air compressors and reservoirs, two main feed pumps, two turning engines, two reversing engines, two ventilating fans with open engines and the evaporating and distilling plant. There are eight single-ended boilers, four being placed in each of the two separate watertight compartments, and each being fitted with three corrugated furnaces having a separate combustion chamber to each furnace. The whole of the material used in their construction is manufactured by the Siemens-Martin process. The boilers are to be worked under the closed stokehole system of forced draught when the engines are developing full power and for this purpose each boiler room is made completely air-tight; eight forced draught fans being provided to maintain the requisite air pressure. Each boiler-room is also fitted with an auxiliary feed pump and steam ash hoist. The steam steering gear is fitted in the after part of the vessel below the waterline, having the hand gear for its manipulation carried to the bridge and conning tower. Steam capstan windlass and anchor gear forward and aft was supplied and fitted on board by Messrs. Baxters, Limited, of Sandiacre, Notts. A complete system of telegraphs, voice pipes and electric reply bells are fitted between the bridge and conning tower and all other important stations throughout the ship.

After the launch Mr. A. Adamson, managing director of the Naval Construction and Armaments Co., proposed success to H.M.S. *Juno* which had been so successfully launched that day. He connected the toast with the name of Mr. James Dunn, of the Admiralty.

Mr. James Dunn, Chief Constructor to the Admiralty, referring to the circumstances of the launch and its surroundings, said they were subjects for thought of a gratifying nature, for there they saw a great well-governed establishment brought into existence and carried on solely by private enterprise, showing at this moment a first-class war cruiser approaching completion and bearing the name *Powerful*; a second cruiser in the intermediate stage between commencement and completion and yet a third cruiser of the first-class in process of commencement. He went on to say that our maritime interests cover all the oceans, our nation's interests were world-wide, our statesmen determined the qualities and quantities of our war fleets, our people find the money and our possibilities were proved by the results of magnificent establishments of the character of that of the Naval Construction Works, of Barrow, where, by a display of such foresight and skilful management as were there seen, there was no limit to the nation's power of production and rapid construction.

Mr. Adamson then proposed the health of Lady Evelyn

Cavendish and presented her with a silver card-case on which was emblazoned in enamel a view of the *Juno*.

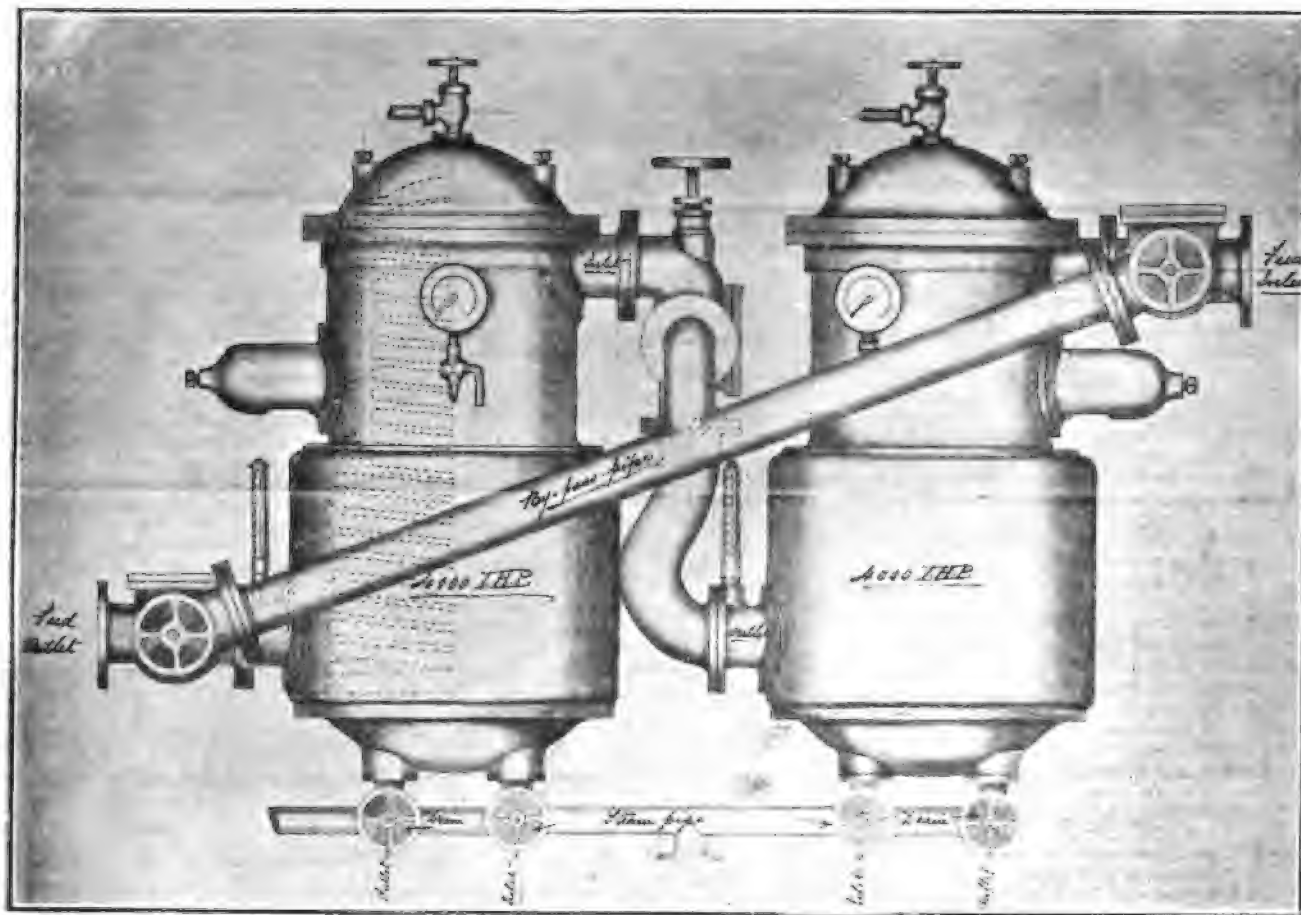
Mr. Victor Cavendish, M.P., replied, and said that the House of Commons—both parties—believed in a policy guaranteeing the efficiency of the Navy; but that House was perhaps the least competent to decide on what the Navy should be: they left that to the experts and able men who directed and controlled the Admiralty. England had now the best navy in the world and he hoped and believed that position would always be maintained.

### WEBSTER'S COMBINED FILTER AND FEED HEATER FOR HIGH POWERS.

IN our September issue, page 231, we illustrated and described this excellent combination of

large powers increasing so much more in proportion than the filtering area, it has been necessary to divide the heating surface between the filtering dome and the lower cylindrical shell. In other respects these filters do not materially differ from those previously described, but it should be noted that the double form possesses the following advantages:—

The by-pass pipe allows of the whole of the feed-water being passed through one filter while the other is being cleaned, thus no feed need pass to the boiler unfiltered. If desired, the feed-water can be doubly or singly filtered by passing it through the two filters in series. Further, the double form also gives a large increase of filtering area, and this is more easily handled when being cleaned.



WEBSTER'S COMBINED FILTER AND FEED HEATER.

Filter and Feed Heater, and we now have pleasure in calling attention to the accompanying illustration and brief description of a plant on this system designed by the inventor for use on war, or the larger class of merchant, ships.

As will be seen, the plant now illustrated consists of two complete units, each capable of dealing with the water for 4,000 I.H.P., or an aggregate of 8,000 I.H.P. A reference to the dotted line half-section shown on the left hand "unit" will show that, owing to the requisite heating surface for

Lightness is obtained by constructing the shells of these large "units" of steel or wrought iron, the covers being of brass.

The inventor, Mr. Albert Webster, of 6, Tower Chambers, Water Street, Liverpool, will supply any further information.

**The Torpedo-Boat Destroyer "Sokol."**—The page plate of the torpedo-boat destroyer *Sokol*, in our last issue, was taken from an instantaneous photograph by Symonds & Co., Portsmouth.

## THE ANGLO-AMERICAN BOILER SOLVENT CO'S PREPARATIONS.

**D**URING the ten years that have elapsed since the establishment of the Anglo-American Boiler Solvent Co., whose works are at Runoorn, Cheshire, their preparations have steadily increased in the public favour, and have also succeeded in carrying off several prizes at the various exhibitions, the only awards granted at the Liverpool International Exhibition (of 1886), and the British and Colonial Exhibition, Manchester (1895), for "Boiler Compositions" falling to them.

Their well-known Boiler Solvent (zincate of soda) is probably one of the most economical and simple means of keeping boilers free from incrustation and corrosion now in use. The Solvent is free from acids, and as it causes any sediment likely to be formed to fall to the bottom of the boiler, instead of allowing it to deposit on the tubes and plates, it effects a twofold saving, first of tubes and plates, as there is no pitting of these, or labour lost in scaling; and secondly, as the heating surfaces remain clean, there is no loss of heat. The use of the Solvent, and a very small quantity suffices, removes all danger of furnace crowns coming down through overheating, &c., as well as saving loss of time and money caused by stoppage of boilers for chipping or scaling. The Solvent is equally efficacious whether salt, fresh, or hard, calcareous water be used, and steam can be more rapidly raised and economically maintained in boilers supplied with it.

Several steamship owners testify to the good results following the use of the Solvent, while many large steam users on land appear to be equally well satisfied with it.

The company's "Condenser Detergent" should certainly be given a trial, as it thoroughly cleanses the cooling surfaces of the condenser of all greasy substances.

The "Detergent" is simply applied and rapid in its action, and where used there is no occasion to draw tubes for cleaning purposes, an operation which is an inconvenient and costly process. The advantages of clean condenser tubes as regards better vacuum, saving in fuel, increase of power, &c., are too well known to need dilution at our hands, and we would also call attention to the fact that the "Detergent" can be used with equally satisfactory results in large engineering establishments as a cleanser of all foul or greasy surfaces, or as a remover of the gummy deposits found in gearing, cogwheels, &c.

Another preparation of the company, which is well worthy the notice of all shipowners, is their "Eucalene" disinfecting, sanitary fluid and cleanser, a compound having powerfully detergent and antiseptic properties. By its powerful affinity for grease it acts as a more perfect cleanser than the best of soaps, and being a vermicide it destroys those forms of insect life which frequently infest ships.

For troop or emigrant ships it would prove specially useful, as in addition to its disinfecting properties it quickly removes all foul smells from whatever cause arising, a fact quickly proved by its removing the sour and musty smell of the bilges almost instantly after its admixture therewith.

## ARMED CRUISER FOR THE HAYTIAN GOVERNMENT.

**O**N November 7th there was launched from the yard of Messrs. Earle's Shipbuilding and Engineering Co., Hull, a single-screw steel armed cruiser for the Haytian Government of 1,000 tons displacement, named the *Crête-à-Pierrot*. The vessel has a flush upper deck, poop, topgallant fore-castle and a complete lower deck. The bow terminates with a cast-steel ram and the stern is elliptic in form. The poop is fitted up with accommodation for the admiral and superior officers, and comprises sleeping cabins and saloons for the admiral and captain, a ward-room, state-rooms, baths, pantries, &c., all fitted up handsomely in polished hardwood.

The 'tween deck space is fitted for the junior officers, armoury and steering compartment, and below these are store-rooms, magazines and shell-rooms.

Forward of the machinery space the 'tween decks is appropriated to the crew with mess tables, lockers and all fittings, as is usual in the British Navy; the hold below this space is fitted for magazines, shell-rooms and store-rooms. Under the fore-castle are fitted the sick bay, steam windlass, lavatories, &c.

The bunkers extend all the length of the engine and boiler space and form a side protection to the machinery and boilers. The vessel is very fully subdivided into watertight compartments, and watertight doors are fitted only where absolutely necessary.

A very complete system of pumping, drainage and ventilation is being carried out for all living spaces, stores, coal and machinery compartments; there is also a complete installation of electric light including a search-light.

The vessel will have a light fore-and-aft rig with trysails and gaff topsails.

There will also be a full complement of boats including a steam launch.

Steam steering gear is fitted amidships with well-protected leads to the tiller aft, and steering stations in the wheel-house and also in a steel rifle-proof conning tower.

The armament will consist of one 16 c.m. quick-firing gun on the fore-castle, one 12 c.m. quick-firing gun on the poop, and four 10 c.m. quick-firing guns on sponsons on the broadsides. In addition there are two Maxim and four Nordenfolt machine guns fitted on the fore-castle, bridge and near the gangways.

The vessel has fine lines, and will be propelled by a powerful set of vertical triple-compound surface-condensing engines capable of driving her at a high speed. She has also a very complete set of auxiliary machinery, and altogether will no doubt make a very useful as well as handsome addition to the Haytian navy.

The naming ceremony was performed by Miss Ernestine Muriel Talbot Reed, youngest daughter of Sir E. J. Reed, from whose designs and under whose superintendence the ship has been built. There were on the launching platform representing the Haytian Government, Mons. L. J. Janvier, Chargé d'Affaires of the Haytian Government in London; Sir E. J. Reed, K.C.B.; Sir F. Seager-Hunt, Bart., M.P.; Captain S. Eardley-Wilmot, R.N.; Mr. and Mrs. A. E. Seaton, Mr. W. Wills, Mr. F. Hill, Miss Seaton, Miss Spettigue, Miss Sanders, Rev. James Griffin, Mr. and the Misses Cole, Mr., Mrs. and Miss Mason, Mr. and Mrs. F. H. Pearson, Mr. D. Douglas, and other ladies and gentlemen.

## NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondent.)

### The Demonstration in the Levant.

**T**HE most important matter in connection with the Navy, so far as the past and present months are concerned, is undoubtedly to be found in the Eastern waters of the Mediterranean. The disturbed condition of Turkey and particularly of Asia Minor threatening danger to the united interests of Europe, has led to something like a concert of the Great Powers, and they are concentrating or strengthening their naval squadrons in the Levant. The British fleet consists of the battleships *Ramillies*, *Trafalgar*, *Anson*, *Hood*, *Camperdown*, *Rodney*, *Collingwood*, *Howe*, *Nile*, and *Barfleur*; the cruisers *Hawke*, *Barham*, *Arcturion*, *Cambrian*, *Sybil*, the torpedo-boat ship *Vulcan*, and the gunboats *Dryad*, *Skipjack*, and *Ardent*. While this strong force is at Lemnos there are also at Smyrna, French, Austrian and Italian squadrons. The first-named consists of the battleship *Devastation*, the cruisers *Charner* and *Linois*, and the gunboats *Faucon* and *La Fleche*. The Austrian squadron comprises the battleship *Tegetthoff*, the cruisers *Elizabeth* and *Donau* and the gunboats *Sebenico* and *Meteor*. Italy is represented by a powerful squadron consisting of the battleships *Re Umberto* and *Andria Doria*, the cruisers *Stromboli* and *Etruria*, with the gunboat *Partenope*. The United States, Russia and Germany have made preparations to be represented and it is hoped that the result of this united action will bring Turkey to reason without delay.

### Preparing for the Naval Estimates.

It is evident that the present Government do not mean to neglect the Navy in any way, and that, when the Naval Estimates come on for discussion the Opposition, if they wish to grumble at all, will only be able to grumble at the amount of money asked for to maintain the Navy. Indeed, it is not supposed for one moment that there will be the least opposition if, as a writer in the *Times*, in an evidently inspired article observes, "If Mr. Goschen were to present, as he probably will, naval estimates of unprecedented magnitude." The Government



cannot ask for too much with which to maintain our fleet because nothing is likely to give us more peace and prosperity than an overwhelmingly strong Navy. Twenty million sterling was voted for naval services during the present financial year, and this year we may expect to see a great advance upon even that enormous sum, for the country is at last beginning to awake to a sense of its danger and will not quibble over the price of its safety. If the article in the *Times* is put forward as a "feeler," and if it answers its purpose, those by whom it was inspired will find that no "feeler" was needed and that the country is ready to pay for its Navy with an open cheque.

#### Augmentation of the Active Squadrons.

The Admiralty is losing no time in strengthening all the principal squadrons abroad and preparing in every way for an emergency. Some time since two cruisers, the *Edgar* and *Spartan*, were sent to China. These vessels are now to remain permanent additions to that squadron and their place in the Mediterranean will be taken by the *Astrea* and *Forte*. The *Trafalgar* and the *Collingwood*, which have been in the Mediterranean for some time, are to be relieved by the *Revenge* and *Royal Oak*. Thus both these squadrons will receive permanent accessions of strength. In the Channel too, while the *Royal Sovereign* and the *Empress of India* are to be relieved by the two new battleships *Magnificent* and *Majestic*, the vessels thus relieved will be at once recommissioned, thus making six strong battleships in the Channel squadron. To the *Blenheim*, which already forms a part of the squadron, the *Blake* will be added, thus making the squadron stronger than it has been for many previous years. In other directions the old and obsolete ships which have hitherto formed drill ships for the Royal Naval Reserve at North Shields and Scutrampton, are to be relieved by the modern cruisers *Medusa* and *Medæa*, and this policy will no doubt be further carried out, for there are plenty of good ships rusting in the dockyards.

#### Torpedo-Boat Destroyers as Drill Ships.

Another sign of the times is to be found in a recent arrangement to be carried out at the seaports in the Channel. At Portsmouth, Plymouth and Chatham, nine torpedo-boat destroyers will be put in commission for the purpose ostensibly of training engine-room ratings in these vessels with the new water-tube boilers. With the same object some of the newer torpedo gunboats will also be commissioned at each of the ports, and it will not escape the attention of those who follow, with interest, the naval movements of the country, that each of these flotillas will be ready for work if required. For a long time the threat of French torpedo boats across the Channel has been a very obvious one, and although the flotilla of catchers and destroyers now commissioned as schoolships may not be a direct reply to this threat, it is manifest that they are a reply, and could, if necessary, before the ink was dry on a declaration of war, be despatched across the Channel.

#### Portsmouth Dockyard.

Although at the end of October it did not appear that there would be any extraordinary pressure upon the work in hand at this yard, events have proved different to those anticipated and great activity has been shown, the probability being that the authorities are anxious to get the work in hand finished to prepare for the new ships which are expected to figure in next year's programme. The *Majestic*, having had her topmast lengthened, is now out of hand and excellent progress is being made upon the *Prince George*, and Messrs. Maudslayi & Sons, who have had her engines in hand, have already placed the boilers and machinery. The *Cordelia* and *Narcissus* have been finished for the pennant, and the *Inflexible*, the portguard ship, is being prepared for docking when a vacancy occurs. The two new graving docks are in a forward condition. The bottoms of both of them have been completed for some time, and the lining on their sides is now being built. A layer of solid brickwork, 14 ft. thick, has been laid over the entire surface, and rows of granite blocks will be used for the lining. From this bed, blocks of beton will form the walls, constructed of broken stone and cement. The backs are filled in with liquid cement. These docks will admit of the *Powerful* class of cruiser. Plans have been prepared for a new system of jetty extension so that the entire sea-front of the dockyard should form one continuous berth nearly two miles in length. Altogether when Portsmouth has got her harbour finished it should be one of the finest in the world.

#### The Argentine Cruiser, "Buenos Aires."

The latest cruiser turned out by the Elswick firm for a foreign Government has just made her trials and has made a speed which, if not altogether unprecedented, is most creditable to her designers, and must be satisfactory to her owners. The length between perpendiculars of this ship is 396 ft.; her beam 47 ft. 2 in.; and normal draught 17 ft. 7 in.; the displacement being rather over 4,500 tons. It has the usual protective deck and in general design resembles all the cruisers that have been turned out by this firm. The guns, carried in protective positions fore and aft, are two of the new 8-in. quick firers, while between these, in the open battery, are ten other quick firers, four of them being 6 in. and the others 4.7. In addition, there are sixteen three-pounders and eight one-pounder guns, with five torpedo-discharge tubes. The machinery, supplied by Humphrys & Tennant, consists of two pairs of inverted direct-acting, compound engines, steam being supplied by four double-ended and four single-ended boilers. The power used on the run was 14,000 H., the steam pressure being about 15.5 lbs., and the vacuum, 28 to 29 in. The speed attained was 23.2 knots with natural draught.

#### The "Edgar" Disaster.

An almost unprecedented disaster has happened to one of the boats of the first-class cruiser *Edgar*, on the China station. Such details as we have received are meagre, but they contain sufficient to enable us to understand how the disaster occurred. It appears that a pinnace, a pulling boat, containing 71 men under the command of the gunnery lieutenant officer of the ship, went ashore on an island near Chemulpo for drill. When they landed, on November 13th, the weather was fine and at 11.30 they started to pull back. As, however, the tide was very strong, the boat was anchored for the purpose of making sail. By this time, although the wind and sea had increased, no danger was apprehended, and under double reefs the boat started again for the ship. She had not proceeded far, and was still fourteen hundred yards from the ship when she filled and foundered. The mishap appears to have been observed from the cruiser, for we are told that assistance was promptly rendered. Out of the whole party, however, only 23 were saved. The loss of life is doubtless due to the distance at which the catastrophe took place from the ship, to the state of the sea and tide, and largely to the circumstance that the men wore their accoutrements as a landing party. Much sympathy has been evoked by the disaster and the naval charitable associations have come promptly to the help of those who have lost friends and relatives.

#### Devonport Dockyard.

At last a commencement has been made with the enlargement of the Royal Naval Engineering College at Keyham. The extension works are to be commenced shortly, and there can be no doubt that this yard will before long be supplied with a capacity of docking which it has long lacked and the want of which has been severely felt. When the *Magnificent* arrives here, as she must if she becomes the flagship of the second in command of the Channel squadron, something must be done before the dock can be made ready for her. In the meantime the *Renown* from Pembroke will take the biggest dock in the place. Great exertions are being made to push on the *Talbot*, the *Furious* and the *Arrogant*, while the commissioning of the *Astrea* has given considerable work in the yard. The *Phænix* and *Algerine*, which are in the building stage, are being expedited and in every department there is great pressure. What with the small craft, of which there are a number in hand, and the new ships, there is plenty of work to last the financial year although Devonport also expects to be allotted a portion of the expected programme for 1896. The *Renown* has arrived here and is to be ready for commissioning next July. The *Black Prince* is to be fitted as a training ship at Queenstown.

#### The Launch of the Jupiter.

The first-class battleship *Jupiter* has at length been launched from the yard of Messrs. Thomson of Clydebank. She received her name from Miss Balfour, the sister of the First Lord of the Treasury; and it was with great pleasure that the announcement was received, which was made by Mr. Dunn, of the Admiralty, in responding to the toast, "Success to the *Jupiter*." He said that "he was able to state that Sir William White, the Assistant Controller of the Navy, was slowly though surely regaining his wonted health and strength." The *Jupiter* is a sister ship of the *Magnificent* and *Majestic* and therefore a



detailed description of her is not necessary. She is the largest and heaviest man-of-war built on the Clyde; her weight when put into the water being 7,000 tons. That she will, when she comes to make her trials, reflect credit upon Messrs. Thomson goes without saying, and it seems likely that before next summer she should be in a fair way towards completion.

#### The Grounding of French Ironclads.

A mishap which at one time appeared to be likely to have serious results has occurred to the first division of the French Mediterranean squadron near Toulon. This squadron consisting of the *Formidable*, flying the flag of Admiral Gervais, the *Admiral Baudin*, the *Courbet*, and the *Marceau*, was entering an anchorage by night when, owing to some mishap on board the *Formidable*, it became necessary to stop that ship, and immediately afterwards she went on shore. The other vessels in endeavouring to get out of the way also grounded, with the exception of the *Marceau*. The *Formidable* and *Courbet* were hauled off without much difficulty, but the *Admiral Baudin*, being more deeply embedded in the sand, took several days to haul off. The ships have been docked, and it is reported that they are not greatly the worse for the accident. The conduct of Admiral Gervais has, however, been called in question, and it is said that he will be relieved from command of the fleet. Naval opinion, nevertheless, is strongly in his favour.

#### Chatham Dockyard.

Now that the *Victorious* and *Minerva* are launched, and the *Magnificent* is out of hand the new cruiser *Vindictive* will soon be laid down. Her machinery will be manufactured in the dockyard. The refit of the *Blake* is complete, and she is ready for the pennant. Her boilers have been fitted with new steel tubes of special design. The *Medusa* and *Medea* have been commissioned not before their places were wanted in the basins. The *Grafton* after a slight refit has left for China with new crews for the *Alacrity*, *Daphne*, *Plover*, *Pigmy*, *Redpole*. The *Immortalité* has also hoisted the pennant after having undergone an overhaul in the yard. More interesting still was the departure of the *Forte*, for her engines and boilers were made in the yard. The ships in hand are the *Illustrious*, *Minerva*, and *Victorious*, to which may be added the refit of the *Monarch*, which is about to commence, and which will consist of a thorough rehabilitation of this old battleship. Nearly a week passes but a new torpedo-boat destroyer is delivered at the yard, and the mishap to the *Lightning* will give work to a number of hands.

#### The New Second-Class Cruisers.

Another of the nine second-class cruisers which were ordered by Lord Spencer has been launched. These vessels, it will be remembered, are modifications of the second-class cruisers of the *Hermione* type. They have a greater length, more beam, deeper draught, and heavier displacement, with 600 greater H.P. The speeds of 19.5 and 18.5 knots at forced and natural draught respectively, remain, however, the same in both classes of vessels, while the armament is considerably heavier in the new ships. The new ship was launched at Barrow from the yard of the Naval Construction and Armaments Co., and given the name of the *Juno*. She is the fifth of the nine cruisers of this description which have been launched, the others being the three vessels built at Portsmouth, Chatham, and Devonport, and the *Venus*, which took the water in the Clyde. Of the remaining four vessels it is expected that two will be launched this year. These cruisers are in all probability the last large war ships in our Navy to be fitted with the cylindrical boiler. It is probable that the reasons which have led to the introduction of the water-tube boiler in many small craft, and in the vessels which have more recently been ordered, will in the end operate for their adoption in all classes of warships.

#### Trials of the "Blake."

The *Blake*, which is about to be commissioned for service in the Channel Squadron, has recently undergone a series of new trials after her refit on returning from the West Indies. The alterations have been considerable. The engine-room has been made more accessible, and the lower compartments more healthy as regards ventilation. New electric light machinery has been provided, and great alterations have also been made in the combustion chambers of her furnaces and other work of an extensive character, while the boilers have been retubed and fitted with ferrules. The mean results for a four hours' trial were as follows: With a steam pressure of 147 lbs. per square inch, maintained with an air pressure in the stokehole equal

to 23 inches of water, the H.P. developed was 19,579; the resulting mean speed of the ship being 21.5 knots. These results cannot but be considered very satisfactory.

#### Sheerness Dockyard.

It is natural that we should take great interest here in the trials of the new sloops, the *Torch* and *Alert*, for both vessels were engined here, the *Torch* being fitted with induced draught. The trials will supply results of comparison which cannot fail to be most valuable. These two vessels, with the *Sheldrake*, *Champion*, *Comas* and *Wye*, have left the steam basins, which for once present an empty appearance. The construction of the *Pelorus* is proceeding apace as far as the material is delivered, and as soon as she is off the stocks her place will be taken by the *Proserpine*. The *Cleopatra*, which has recently arrived from North America, is to be fitted here as a training ship, but beyond this there is little work in hand. The coast-guard cruiser *Active* is having a thorough overhaul and repair in the basin, and the torpedo gunboat *Leda* is also having defects made good. In addition to these vessels the work in hand is only of a temporary nature.

#### Commissions and Re-commissions.

During the past month a large number of ships have been commissioned at home. These include the *Forte* and *Astrea*, new cruisers for the Mediterranean, the *Narcissus* and *Immortalité* for China. The *Cordelia* and *Curacoa* for the West Indies, where they will relieve the *Cleopatra* and *Canada*. In addition the *Sappho* and *Grafton* are docking, new cruisers taking new crews to the Cape and to China for the purpose of recommissioning several of the small craft on these stations. Early this month the *Magnificent* and *Majestic* will replace the *Royal Sovereign* and *Empress of India*, while these ships will be recommissioned for service. The *Medusa* and *Medea* have also been commissioned to relieve the *Castor* and the *Trincomalee*. The *Leander*, which has returned home from China, was paid off on the 26th ult., and the *Cleopatra* will pay off on the 6th inst. The *Basilisk* is to be commissioned to relieve the *Beagle* on the south-east coast of America, and the *Rupert*, on December 12th, to become the port-guard ship at Gibraltar. It is also reported that the *Fox* and the *Flo-a* will be added to the Channel Squadron. The next ship to be launched will be the *Diana* from the yard of the Fairfield Shipbuilding Co., at Govan, on December 5th. The orders for the new first-class cruisers, which in displacement will take a position between the *Blake* and the *Powerful* classes, have been placed with the three following firms: The *Diadem* with the Fairfield Shipbuilding Co., the *Europa* with Messrs. Thomson, of Clydebank, and the *Nisbe* with the Shipbuilding and Armaments Co., at Barrow. Sister ships to these are already in hand at the four naval ports. The *Andromeda*, which is to be built at Pembroke, will be provided with machinery by Messrs. Hawthorne, Leslie & Co.

#### Pembroke Dockyard.

This yard has recently presented a scene of greater activity than is usual, owing not only to there being more ships in hand than had been usual for some time, but also through the hurry necessary to get the *Renown* ready for her departure to Devonport. It will not be long now before the *Hannibal* is launched, and then no doubt some vessel of the new programme which is promised will take her place. It is to be hoped that in the new Estimates, Pembroke dockyard will not be forgotten. This yard certainly requires many modern improvements to bring it up to date, and not the least is it necessary that the harbour in front of the yard should be permanently improved and fitted for the reception of large vessels. The trials of the *Renown*, engined by Messrs. Mandalay, were very satisfactory, and the contractors have secured the bonus of £1,600 which the Admiralty undertook to pay in addition to the contract price if the ship could be got ready to leave on the 15th of November. The *Renown* was launched on May 8th, and as she was under steam on November 7th, a day less than six months, the result is very creditable to Pembroke. Good progress is being made with the *Andromeda*, and it is evident that the Admiralty are desirous of pushing the ship on as fast as possible, although work on the *Hannibal* prevents any large number of hands being allotted to the cruiser. Additional defences of the haven are contemplated by the military authorities. At present there are two mine fields, one outside and the other inside the Stack Rock fort. It is proposed to lay down two new mine fields further up the haven, and in all probability the strength of the Royal Engineers at this port will be increased for the purpose.

## The "Sokol."

Torpedo-boat destroyers continue to attract considerable attention. It is said that the Russians are so satisfied with the *Sokol*, built by Messrs. Yarrow, that they intend providing themselves with thirty more boats of the same class. The Emperor of Russia, who inspected the *Sokol* at St. Petersburg, is reported to have been delighted with her, and she appears to have made a fine passage across the North Sea, proving herself a capital sea-going ship. The Argentine Government have also, it is said, placed an order with Messrs. Yarrow for several vessels of this description. One of our own torpedo-boat destroyers, the *Lightning*, came very nearly to an untimely end when she was running her trials the other day. She had completed her speed runs of three hours' duration making a mean of 27.9 knots, the test giving 31.3 knots, or over 36 miles an hour, moreover there was an entire absence of flame from the funnels and absolute freedom from vibration. When, however, the trial was completed and she was running at the rate of 12 knots on her homeward journey, she came into collision with a collier crushing in her bow to the collision bulkhead. Fortunately the damage done was confined to the bow, and the vessel was enabled to return to port, although during the night she grounded on the Maplins, and those on board, 80 in number, must have spent a very unpleasant time. The mishap has had the advantage of showing that, flimsy in construction as these vessels seem to be, they are yet sufficiently well built to resist even such a disaster as this.

### SPLENDID RESULTS BY A JARROW-BUILT TORPEDO-BOAT DESTROYER.

H. M. torpedo-boat destroyer *Lightning*, delivered at Chatham by Palmer's Shipbuilding Co., Jarrow, went through her official trials on Tuesday, November 5th, in a remarkably creditable manner.

The contract called for a speed of 27 knots per hour maintained for three consecutive hours, and this the builders have exceeded by practically 1 knot per hour. The average for the three hours gave 27.944 knots per hour. In the best of the runs over the Maplin the *Lightning* literally flashed past the mile posts in 1 min. 55 secs., being equal to 31.3 knots, or over 36 miles per hour. She had all her weights on board, being loaded down to contract conditions. The entire absence of flame from the funnels, and the absolute freedom from vibration, which made her sister ship the *Janus* (also Palmer's build) so conspicuous, were just as marked in the case of the *Lightning*.

These vessels show that it is quite possible to attain such high speeds without, as has generally been assumed, the above objectionable features being a necessary accompaniment.

The *Lightning* is a duplicate of the *Janus*, the propelling machinery consisting of two sets of three-cylinder triple-expansion engines driving aluminium bronze propellers, and supplied with steam by four of Reed's patent water-tube boilers.

The whole result was obtained with the greatest of ease, and the working of the machinery, also the steaming of the boilers, was all that could be desired.

The amount of coal consumed during the three hours was 14 tons, which is believed to be lower than for any of the torpedo-boat destroyers delivered to the Government. The steam pressure during the trial averaged 195 lbs. per square inch, and the average revolutions 368 per minute.

After the three hours' speed trials had ended the vessel was put through an elaborate series of other trials, including full speed circles in both directions, circles astern at a little under full speed, also circles and general steering by hand gear.

The handling of the engines with regard to stopping and starting was very severely tried, and seeing that with the hand gear only about 7 secs. were necessary to go from full speed ahead to full speed astern, nothing better could be desired.

The vessel was in command of Lord Charles Beresford. Mr. Welch and Mr. Emdin watched the trial on behalf of the Admiralty. The trial was conducted on behalf of the contractors by Mr. J. W. Reed, their engine works manager. Mr. W. J. Anstey represented the interests of engineers' department of the dockyard, and Mr. E. Cornish that of the Steam Reserve.

It may also be stated that the *Lightning* on her run round

from the Tyne occupied only about 13½ hours to cover the distance, running about 20 to 21 knots practically under natural draught. This is probably the greatest speed at which a vessel has gone from the Tyne to the Thames. Altogether the builders are to be congratulated on the successful results.

## H.M.S. "JUPITER."

H. M.S. *Jupiter*, which was launched by Messrs. James & George Thomson, Limited, Clydebank, on Monday, November 18th, is a first-class battleship of the *Majestic* class. The dimensions are:—Length, between perpendiculars, 390 ft.; breadth, extreme, 75 ft. 9 in.; depth, moulded, from upper deck, 44 ft. 9 in.; mean draught, 27 ft. 6 in.; displacement, 14,900 tons. The protection consist of an armour-belt of Harveyed steel 9 in. in thickness, which extends for 215 ft. At the ends are transverse armour bulkheads, also of Harveyed armour, which below are 12 in. in thickness, and above 9 in.; and in addition there is a protective deck of from 3 in. to 4 in. in thickness extending from end to end of the ship. This deck is arched, and is intended to protect the magazines and machinery from fragments of shells and falling shots. At the bottom the belt, which extends up to the main deck, and is about 15 ft. broad, is 5½ ft. below the water line, and before and after the belt the protective deck is at a lower level than amidships, so that the ends of the ship are protected by an under-water steel deck. The hull of the vessel has been coated with Hartmann's Rahtjen's composition. The heavy guns are four in number, and each is of 46 tons weight and 12 in. calibre. They will be mounted in pairs in redoubts of Harveyed armour, 14 in. thick, above the main deck, and 7 in. thick below, extending from the protective to a few feet above the upper deck. The freeboard of the ship is exceptionally great, the centre of the guns being about 27 ft. above the water line. The secondary armament consists of 12 6-in. quick-firing guns, all of which are mounted in armoured casemates on the main and upper decks, which afford protection to the crews working the guns from the enemy's quick-firing shot and shell. There are also a number of smaller quick-firing and machine guns, and 5-in. torpedo tubes. Four of the latter are in submerged compartments, so that as the torpedoes are discharged below water there is no danger of them being exploded before being fired by an enemy's shells. The other tube is fitted at the stern on the main deck and is protected by an armoured mantlet. The ammunition is worked in a passage underneath the protective deck. From this passage are armoured tubes to the various guns, and by means of hoists the ammunition is conveyed to the respective guns, without being exposed to shell fire. The main and middle decks aft will be fitted for the use of the Admiral and captain and their numerous staff. The whole of the remainder of the main deck and middle deck forward is devoted to the messing and sleeping quarters of the crew. The total complement of officers and men will be about 800 all told. The machinery space is divided by means of longitudinal and transverse bulkheads into six watertight compartments, two of which will be used for the engines and four for the boilers. The vessel has a large coal capacity, having space for 1,800 tons in side bunkers partly above and partly below the protective deck. The spaces below the protective deck at the ends of the ship are largely devoted to the stowage of ammunition and torpedoes, and contain also the steering gear, capstan engine, ventilating and air-compressing engines, and the dynamos, all of which being essential to the fighting efficiency of the ship, are necessarily kept below. The vessel is fitted with bilge keels in order to reduce the rolling to a minimum. The engines of the vessel are of the vertical inverted triple-expansion type. The collective H.P. is estimated to be 12,000, which will give a speed of about 17½ knots on trial. The boilers, of which there are eight, are of the ordinary single-ended return tube type.

**More Warships.**—Two more vessels for the Russian Navy will shortly be launched at St. Petersburg, one being a gunboat and the other a training vessel. Four more warships are also about to be started, two of which will be cruisers of 12,000 tons displacement, which are to be finished complete within two years.

## THE NEW ARGENTINE CRUISER "BUENOS AIRES."

THE official speed trials of this cruiser, which has been built for the Argentine Government by Sir W. G. Armstrong, Mitchell & Co., at their shipyard at Elswick, took place on Saturday, November 2nd, off the mouth of the Tyne.

The *Buenos Aires* is a steel ship, sheathed and coppered, and is of the following principal dimensions:—Length, between perpendiculars, 396 ft.; breadth, extreme, 47 ft. 2 in.; and designed mean draught, 17 ft. 7 in., at which her displacement is 4,500 tons. Her propelling machinery, which has been constructed by Messrs. Humphrys, Tennant & Co., of Deptford, consists of two sets of four-ported triple-expansion inverted cylinder engines, having 40 in. diameter high-pressure, 60 in. diameter intermediate pressure, and two 66 in. diameter low-pressure cylinders, all with a piston stroke of 36 in., steam for which is supplied by four single-ended and four double-ended cylindrical return-tube boilers, the tubes being fitted with Messrs. Humphrys' patent ferrules.

Owing to the fog on the day of the trials, and the delay occasioned by it in getting the vessel free from her moorings, she had to be put on the measured mile as soon as she was clear of the river's mouth, and before her engines could be got up to their full speed or power. As the conditions of the trial were that the ship should run for six consecutive hours with natural draught, or with not more than  $\frac{1}{4}$  in. of air pressure in the stokeholds, and during that time make six runs on the measured mile with and against the tide, it was elected to make the mile runs first, and from them deduce the speed attained during the remainder of the six hours' contract running time.

The condition of the weather having prevented the vessel getting under way as early as was intended, the first two runs on the mile, which were made in 2 min. 47 $\frac{1}{2}$  secs. and 2 min. 34 secs. respectively, although they exceeded the contract speed, could not be taken as a criterion of what the ship was capable of attaining, as the succeeding four runs were made at a mean speed practically of 23 knots an hour. The mile runs being completed, the vessel was then headed south, and the remainder of the contract time run off, the resultant mean speed throughout the whole of it being 23.202 knots an hour. During the running the engines averaged 151 and 151 $\frac{1}{2}$  revolutions per minute for port and starboard respectively; the mean boiler pressure was 15.5 lbs. per square inch, the vacuum 28 in. to 29 in., and the total I.H.P. developed 14,000.

The *Buenos Aires* is constructed with a steel protective deck throughout the whole of her length, 3 in. thick on its sloping sides, and  $1\frac{1}{2}$  in. thick on the flat parts, the machinery space being protected with inclined armour, 5 in. thick. For her size the ship is very powerfully armed, as she carries four 8 in. quick-firing guns on the upper deck, four 6 in. guns at the ends of the battery, six 4.7 in. guns disposed between each pair of 6 in. guns in the battery, sixteen 3-pounder guns—eight being on the main deck and four on the bridges—together with eight 1-pounder guns distributed in the tops of the two military masts. The ship is also fitted with five torpedo tubes, all above water.

The Argentine Government was fully represented at the trials, as were also the contractors; Mr. Soper, of Messrs. Humphrys & Co., being in charge of the machinery. There were also present the French and United States Naval Attachés.

## THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

### The Channel Fleets.

MY attention has recently been called to the mail services run across the English Channel, the German Ocean and the Irish Sea. In the first place we have had the intimation of the great undertaking now being prepared by the City of Dublin Steam Packet Co. In the next, I have had an account of a cross-channel passage sent me by a correspondent who in the latter half of the present year of grace, braved the raging deep in Her Majesty's Mail Packet *Samphire*. This vessel, now of the mature age of 84 years, is considered quite good enough for the most important work of our shortest link with the continent. Thirdly, I have been reading a very interesting book of reminis-

cences of an Irish judge who tells us how great were the discomforts of the passage of St. George's Channel in the earlier half of the century. I have already told all I know as yet about the City of Dublin Co.'s new boats. I can dispose of the judge's experiences by a short quotation, but the London, Chatham and Dover's affairs will need a special paragraph of their own. I do not think that much attention has been given to the history of the various important services round our coasts and I propose—if information regarding them be attainable—to deal with one in each lot of my notes, at all events for a few issues.

The judge from whom I am about to quote belonged to an old county family in Ireland, and his people made a yearly pilgrimage to London. From their family seat they proceeded to Waterford in the family coach with a retinue of servants following them. At Waterford they took ship. The account will make it easy for the youngest of us to appreciate why Thackeray and writers of his day always described their richer travellers as remaining boxed up in the confinement of the coach. "We used," he says, "to reach Waterford in the early forenoon, and the carriage was hoisted on board through swarms of beggars, gesticulating, shrieking and fighting for an alms, and through herds of cattle and swine crowding the quay in multitudes. A steam boat, not as large as a tender of this day, with a long, thin funnel and square-rigged masts—steam had not yet nearly replaced sails—lay puffing and snorting by the landing-stage and hours were spent in shipping the cargo, the occupants of the carriage taking refuge in it. We were at last under weigh, a motley assemblage of passengers, sailors, cows, sheep and pigs, huddled together on a noisome deck, and fortunate it was if, after a voyage most detestable even in the finest weather, we reached the mouth of the Avon in 30 hours and had a favouring tide to take us to Clifton. In passages of this kind the chief discomforts—and those who endured them know what they were—were the abominations of a cabin filled with sea-sickness, and the hideous groanings and gruntings of the animals above. But woe betide those who, in the weak steamers of those days, were caught in one of the tempests of the Bristol Channel. The vessel was a mere toy to the winds and waves, and often had to lie to and scarcely move for hours; and the scenes of misery and fear amongst the wretches below were not unlike the horrors of the Middle Passage. I was once nearly four days on the voyage; we went short of coal and burnt the cabin furniture, and we had to take refuge under the lee of Lundy, unable to make a mile of headway. On occasions like these the unhappy cargo of live stock were always ruthlessly jettisoned; the spectacle was enough to make one's blood run cold. Our party, dragged, dirty, and sick, was landed at Clifton by the river-side." Now I ask whether such an account does not give most graphically an idea of the vast improvement which the marine engineer has wrought in his art. For we must presume that the hull of "the weak steamship" of those days was pretty staunch or she would soon have been pounded where she lay, helpless in the trough of the sea. They could build hulls but engines were not yet "ful powered." The improvement in the Channel services is not less marked than that on the ocean, but it seems to have attracted less attention and so to be a suitable matter for treatment in these columns.

### The Flushing Route.

Seems a fair commencement for my Channel work, as it is the line which has most recently added to its fleet a set of sisters capable of, by themselves, carrying on one of its services altogether. I find, however, in this, my initial attempt, that it is not altogether easy to get the kind of information my readers and I desire from the companies, and there is a deal of private research required to find out anything worth knowing.

It appears that the port of Flushing has only been adapted for the class of work in which the Zealand Line is engaged for a space of two-and-twenty years. Prins Hendrik was the man who interested himself in the development of the port and of the railway and steamboat facilities connected therewith. The Steamship Line—in the cheap way which steamship companies affect—have not been ungrateful, for two vessels of the fleet have borne his honoured name.

The port being there, the company proceeded to develop it. They had to look out, of course, for a corresponding port on the British side, and after much deliberation they eventually fixed upon Queenborough. The route has the advantage of being direct, with a very moderate journey from London, whilst a good part of the passage is made under the shelter of the land. When they had completed their arrangements with the Railway

Companies—a task of some importance, as nobody ever wanted to stop at any channel port, save perhaps at some of the watering places, and that only in the height of the season—and arranged facilities which made their route the most direct and comfortable between London and such continental capitals as Amsterdam, Berlin and Vienna, the Steamship Co. set to work to get a fleet to carry on the service. This was at first a night service only. Now the official information vouched as to this original fleet is of a very meagre description.

We are merely told that a night service was “begun in 1875, a small fleet of paddle boats having been purchased in England,” and that “these boats, though goodly specimens of their kind, did not reach the high standard of speed and comfort” aimed at by the Prince. It seems to me that the individuality of the ships, here so curtly dismissed, is one which had great influence on the destinies of the line itself, and it certainly had the greatest interest for outsiders. This little fleet contained *Isle of Man* boats, which had shown their paces in the very unpleasant crossing of the Irish Sea, and at least one vessel which had passed an exciting and adventurous youth in the historic blockade running, when the Northerners were keeping closed the cotton ports during the American Civil War. From these boats came the idea, now stereotyped in the line, that the mode of propulsion must be paddle, and from them, too, came the original cabin arrangements.

It was in 1887 that the first pair of sisters, specially built for the line, made their appearance. They were from the Fairfield Yard, as have been all their successors. They were vessels of some 1,600 tons gross, and had engines of some 600 N.H.P. of the compound oscillating type. Their indicated H.P. was something like 8,500, and they were of course a revelation of what comfort and speed might be to the traveller of that day, who had no opportunity of going to the continent in anything over a thousand tons by any railway service, and who had been taught that the *Foam* and the *Breeze*, of a quarter the size of these ships, was quite good enough for the mail and passenger service. These two vessels were called after two princesses of the reigning House of Orange, and they were soon reinforced by a similar vessel as a reserve, this being called after the energetic Prince who headed the enterprise.

This was in 1880. Three years later another pair were added, and in 1887, when the day service was undertaken, three more were built. All these steamers were practically identical. The present year has, however, seen a determined bid on the part of the “paddle-wheel line” for public favour, a set of three sisters having been turned out from Fairfield. The tonnage of these exceeds that of their predecessors by some 400 tons each, whilst their triple-expansion engines are of 8,000 I.H.P. The greater length of the new boats will make their passage more regular in bad weather, and will certainly add to the comfort of passengers. The saloon arrangements tend in the direction of giving greater privacy to the night passenger, and to giving him most of the comforts which are afforded to the ocean traveller. One of these new steamers, the *Prins Hendrik*, has already joined the service, and on her trial exceeded a speed of upwards of 20 knots for a distance of 110 nautical miles. Before these Notes are in print it is believed that the whole of these three very fine and fast boats will be at work.

Personally, I believe in the twin screw for channel boats. Yet it is chiefly from the owners' point of view that the twin screw is preferable. The passenger has a belief that the paddle steamer is a more comfortable sea-boat, and he can here gratify his fancy. Whether the paddle is equally satisfactory to the owner in the long run remains to be seen, for it is undoubtedly uneconomical, and it may be hard for these vessels to compete with the more economical twin screws on other routes. For though the paddle may attract passengers it will not induce them to pay higher fares. Another objection to the paddle is the fact that vessels so fitted are useless as auxiliaries in time of war. As, however, the vessels of the Zealand Line are under the Dutch flag the point is of slight interest to Englishmen. It can, however, be said that this is one of the best maintained services crossing the channel, be the flag British, Belgium, Dutch, or French.

#### The Financial Position of Shipping Companies

is occupying the columns of several of our contemporaries. Some little time ago a weekly paper pointed out how badly the great Atlantic companies were faring. Now a monthly magazine has a very bitter attack upon a number of lines, including some

of these and others which trade in more distant waters. There is no doubt that there is much truth in all these strictures. But the weakness spoken of is largely inherent in the business. A big and fast mail steamer costs anything up to £40 a ton. Like a carriage, she falls in value the instant she ceases to be absolutely new, though her earning power does not decrease so rapidly. Depreciation ought to be based upon a scale which would write off the whole value in ten years. For in ten years the vessel, though by no means worn out, will be out of date for the trade for which she was designed. No company, however, allows so great depreciation, and consequently the position of none of them can be quite sound. The obvious inference must be that the companies do not get sufficient return for the work they do and the facilities they give. Our British companies get the same rates as foreigners with whom they compete, from the passenger and cargo sources. We cannot help them there. It is the mail and subsidy question that they lose upon. They are competing with subsidised foreigners in the mail carrying business and the shareholders' capital leaks away to make up a handsome surplus for the Postmaster-General. A few years will at this rate make the position clear even to the minds of politicians.

#### The Value of Old Liners

is well shown by the recent attempted sale of the *Alaska* and *Arizona*. These vessels were the fastest mail boats of the day, were built by one of the first firms in the world, and are certainly not old. Yet, though the sale was well attended, and great interest manifested in the occasion, the ships were withdrawn at prices which were not a tithe of the original cost of the vessels. Four pounds a ton was the highest estimate of their value which a bidder was inclined to back with his purse.

On valuations such as these the fleets of many mail lines would have to be written down very considerably. Of course, the managers would say that the ships may only be worth such prices at forced sales, but “our ships do our work very well, and are not going to be sold by forced sale.” This is true enough. But the difference between the forced sale price and the book price is [simply an estimate of the good-will of the company's business and that is an asset of doubtful value and one that fetches nothing in a winding-up.

#### Yachting Tours.

I have received several circulars and notices regarding the attractions offered by the various public yacht owners to those who wish to escape the rigours of an English winter.

The Orient Line with their steamers *Lusitania* and *Garonne* have arranged four trips. One a two months voyage to Madeira, the Canaries, and on to Bermuda and the West Indies. The other three are variously arranged tours in the Mediterranean and the Levant. There is a new departure of this line for next year, they having arranged an astronomical yachting tour to Vadso for the purpose of enabling their friends to witness the eclipse of the sun.

The express steamers of the Hamburg Line will, as in previous years, make Mediterranean tours as will the French Transatlantic boat *La Touraine*, her last year's experimental voyage having been eminently successful.

Those who wish to combine a course of plainer living and high thinking at very moderate fares in the company of church dignitaries will have an opportunity of visiting Palestine in one of Mr. Perowne's tours by the a.s. *St. Sunniva*, a vessel which is very favourably known on the Norwegian yachting tours.

The Wilson Line are running their a.s. *Rollo*, of some 1,600 tons also in the Mediterranean, so that there are plenty of opportunities for intending passengers to travel by fine and comfortable vessels, owned by responsible persons who understand the management of steamers and the means of attending to the comfort of their voyagers without going to the more doubtful if cheaper tours advertised by some public yachts.

#### Southampton.

Southampton has suffered a blow to her prestige in the partial defection of the Hamburg-American Line, which announces its intention of making its eastward call at Plymouth *vice* the passenger port.

Southampton, which has been so proud of its acquisitions and its developments, is naturally sore. But there is little reason why it should be. The Hamburg Line in the old days called at Plymouth and it goes back in a half-and-half sort of way to its old love. But the Hamburg Line is only a fair-weather kind of line, which sails merely during the height of the passenger season

in the regular Atlantic trade, and which devotes its attention to Mediterranean yachting tours during the rest of the year. Its best friends could wish Southampton that it may never have any worse disaster.

The Southampton people should look after their scribes however. I find in the *Southampton Times* for the 9th November a paragraph stating that the "*Berlin*" on her last trip eastward broke all previous records between Southampton and New York. The vessel accomplished the journey from the Needles to Sandy Hook in something like 8 days 10 hours. The *Berlin*, it will be remembered, was hurriedly equipped at this port, being commissioned owing to the recent mishap to the *S. Louis*."

Now I did not know that the journey from the Needles to Sandy Hook was an eastward one. That however may be a clerical error. But no clerical error will explain the statement that 8 days 10 hours is the record between Southampton and Sandy Hook. It may be the *Berlin's* best run, but it is certainly not "the record." I think there is a line that professes to carry passengers via Southampton between London and New York in six and a half days. Though it has scarcely ever done so, it has got within an hour or so of its profession, and is certainly a full two days better than the *Berlin's* best performance. The writer may have meant "the record for the *Berlin*." If that is what he meant let him have it. I have no time to waste examining "the records" of such as she.

The same column contains another injustice to America. It is stated that "the best day's run ever recorded by the American Line steamer *Paris* was 521 nautical miles. This feat was enacted by her whilst on a passage from Liverpool to New York." Here again the writer understates the case in his client's favour. The *Paris*, whilst under the British flag, once did, according to the official statements of the day, no less than 530 nautical miles.

Speaking of this steamer it is said by the *New York World* that the opening up of her machinery at Cramp's yard showed that the hard wear got out of her of recent years has had a deplorable effect upon her boilers and furnaces and that she will want a very great deal of attention before she resumes her old form.

#### The Anchor Line.

In the fierce competition between Liverpool and Southampton we are apt to forget that Glasgow has a very fair share of the facilities for saloon passengers across the Atlantic. The Anchor Line runs in its weekly service the fine steamers which formerly carried on for it the fortnightly one from Liverpool to New York. Steamers of the class of the *Furnessia* offer great comfort, whilst the *City of Rome* is the largest single-screw boat in existence, and on her present station maintains the speed which distinguished her at Liverpool. I have been watching her recent passages very closely and am surprised to see how regular they have been.

#### The West India Royal Mail Steam Packet Co.

publishes information that the three new steamers it has ordered from Messrs. Napier are to be economical cargo boats, each of some 4,000 tons burden and some 12 knots speed. They will be single-screw vessels, and all this fuss has been made about the kind of thing P. & O. of late years has ordered quietly by the dozen. These vessels compare very unfavourably with what the Atlantic lines consider cargo boats. I suppose the *Georgic* could load the materials of the whole three. The *Corinthia* crossed the Atlantic on her maiden voyage at a speed a knot and quarter better than these vessels guarantee. We must suppose, from the management having ordered them, that they are very suitable for the purpose for which they are intended, but they are certainly nothing to speak of in any shape or way.

The names of two of them were published at the same time. One is to be called *Minko*, a name already used in the fleet. The other is to take the famous name of *La Plata* which has twice been used for vessels of the line. The previous holder is still afloat as a public yacht. She was a favourite passenger ship on the company's Brazil Line. But the first holder was the famous ship which was brought from Cunard's to fill up the West India Mail Line in its palmy days when its fleet was second to none. The line had suffered several heavy losses within a very short period, and it was lucky to be able to get the immediate call of such a magnificent ship which served them well for a number of years and was one of the few of their fleet, in those waters, that safely weathered the great West India hurricane. It seems a great pity for so famous a name to be carried by a mere 12-knot cargo boat.

#### The New Cunarders.

One could not help being somewhat amused at a little remark in *Engineering's* account of the two new Cunard cargo boats. It concluded with the words. "Both vessels have been on their station some time and are working satisfactorily." Both vessels have "been on their station some time," in the sense that they have been some time delivered at Liverpool. The earlier of the two was on her third homeward trip when that account was published. But the vessels had been lying up in Liverpool Docks all the summer, and the later of the sisters was on her maiden outward trip for Boston direct, making no call at Queens-town, when the issue left the press. No idea of her working in service could possibly have reached the writer unless lying quietly in dock and never trying to get to sea on her own account was working satisfactory in his eyes.

I may, however, say that he was quite correct, though a little previous in his assertion. She made the passage from Liverpool to Boston in 8 days 21 hours, and averaged 13½ knots throughout. This is an excellent performance for the first trip of a cargo boat even of the highest class.

#### An Expensive Soup.

The American Line have, according to a paragraph in the *Shipping Gazette*, had a very expensive suit brought against them by one of their passengers. This gentleman had a tureen of hot soup spilt over him by a steward on the s.s. *Berlin* on a voyage from Southampton to New York. This is not altogether to be wondered at when we see the difficulties of waiting at table when the room in which the repast is served evinces a strong desire to turn itself upside down. I know the results are unpleasant, for I once had some turtle soup poured down my own back in connection with a banquet on *terra firma* in honour of the American Line. Still it was left to Yankee ingenuity to seek compensation for wounded feelings of this description in a court of law. The plaintiff, who proved to the satisfaction of the jury that he had sustained permanent injuries, found his compensation in the handsome sum of one thousand pounds sterling. This is a serious matter for the company. One cannot help wondering whether they might not have defended the action successfully by pleading that the accident was due to the motion of the ship, and was in fact "a peril of the sea."

From the same source I learn that great dissatisfaction is being manifested at Boston with the service given to passengers between that port and England by the Cunard Line. They speak of the facilities which the port offers, and of the slow service which they receive from this the only passenger line they have. They speak of "nothing but ten-day boats" being given them. This is by no means a correct statement. The *Gallia*, *Scythia* and *Bothnia* are on the station as well as the *Cephalonia*, *Pavonia* and *Catalonia*. These last three are practically sisters, though it is true that the *Catalonia* is the slowest of the three. She is certainly better than a "ten-day boat." The other two sisters would average not more than nine days. The *Scythia* and *Bothnia* are nearly a day better still, whilst the *Gallia* gets down to under eight days. It is true that the *Gallia* does not run in winter, but that is because there is no inducement offering. The Boston people, before they appeal for some stranger to come over and help them, should make the best use of the facilities to their hand. If they made full avail of the boats they have, there is no doubt that Cunard's would be glad to give them the *Servia* and the *Aurania* in the passenger season. Meanwhile, they had better try and get rid of the remains of the *Venetian*, which are a standing advertisement of the dangers of their port, and a strong discouragement to those who might feel inclined to send large and valuable ships thither.

It is now reported that the complaints of the Boston people, whether well or ill-founded, have induced the managers of the Leyland Line to promise that they will carry a limited number of first-class passengers by their boats. The noteworthy feature about their programme is that the passengers will be carried in single berth cabins. The tendency is certainly in that direction, and I suppose the next generation of travellers would as soon think of sharing their state-rooms with a stranger as of combining to take a bedroom on land with the first person they casually encountered in the smoke-room of a hotel.

#### The Belgian Steamers

between Dover and Ostend ought shortly to engage our attention amongst the fleets of the narrow seas. Meanwhile, it may not be amiss to notice that the land connections on the oth



side are being improved by this route and that from the 12th November passengers could leave London by the 10 o'clock train on Tuesday morning, and reach Constantinople via Constanza by 9 o'clock on Friday morning. Provided the boats and trains ran to time—which is rather a large assumption when we get to the East of Europe—and supposing further that three hours in Constantinople were all the time the traveller required for the transaction of his business, he might be back again in London by 5 o'clock the following Monday, having been away 17 hours less than a week. This is rapid travelling, and ought to be as comfortable as circumstances will permit, for the trains are furnished with conveniences to enable the traveller to eat and rest as he rushes across Europe.

#### Gallantry at Sea.

The American Line steamer *Berlin* was enabled to effect a very gallant rescue on November 14th on the Atlantic. She fell in with the schooner *Modus Vivendi*, from Bristol to St. John's, N.F., with a general cargo and a crew of six men. She was a little craft of 80 tons and had been three weeks on her voyage. Four days before the *Berlin* came up; she had been struck by a sea which took overboard one of her men and destroyed the one boat. It also strained the vessel to such an extent that the survivors were unable to cope with the inflow of water. In the nick of time the *Berlin* came up and, in spite of the heavy sea running, Captain Lewis managed to lower a boat with eight men and Mr. MacDonald Todd, the chief officer of the steamer. After some difficulty they were successful in saving all on board the *Modus Vivendi* and getting them on board the *Berlin*. The men recovered from their exhaustion, thanks to the kind treatment they received, before they got to Southampton, but they lost everything they possessed in the wreck. If the *Modus Vivendi* had carried a foreign flag Mr. Todd and his men might have reckoned upon getting some public recognition of their bravery, but as both ships flew the Union Jack I suppose their own feelings will have to be their sole reward.

Amongst the lieutenants of the Royal Naval Reserve taken into the Royal Navy on the supplementary list appears the name of Lieutenant Robinson, the officer who distinguished himself by leaping from the *Tautonic*, when she was running at full speed, into the sea after a suicidal passenger. Men like this will be a valuable addition to any body in spite of the jibes which some papers cast at the R.N.R. officers. We may be sure that the officers of the Navy also take this fair view and that these writers do not at all fulfil their pretence of representing the real opinion of the Navy.

#### STEAM FEED FOR MARINE BOILERS

WE had the other day an opportunity of inspecting a novel arrangement, patented by Mr. Hall, of Messrs. Fairburn & Hall, engineers, of Manchester, for supplying steam feed to boilers in place of the ordinary water feed, which seems to be particularly applicable for adoption on steam ships. Mr. Hall, in designing this steam-feed generator, upon which he has been at work for the last few years, has proceeded on the lines that the practice of feeding boilers with water of a low, or comparatively low, temperature, compared with the actual temperature in the boiler itself, is based upon a wrong principle, and exercises an injurious influence upon the life of the boiler by causing excessive strains on the joints or stays, and other troubles well known to practical men. His aim is to assist the boiler by dealing with the feed water through an independent steam producer, so that it practically becomes a high temperature steam feed, 10 to 15 degrees above the temperature in the boiler itself. The steam producer is a steel—or iron—cased furnace, lined with fire-brick to retain the heat and thus ignite fuel from above as well as from below. A cylindrical iron or steel shell is placed over the furnace, with double casings, the space between the

inner and outer casing being filled with sand to prevent loss of heat by radiation; and within the shell is placed a series of three circular iron or steel coiled tubes, connected together to form one continuous tube, and set one within the other in such a manner that all the products of combustion are utilised to the fullest extent, passages being arranged along which the heated gases are constrained to pass, first up the central passage, at the top of which they are diverted by a deflector of fire-brick, and caused to descend the passage between the inner and intermediate coils, from whence they are free to ascend the passage between the intermediate and outer coils, and also the space between the outside of the coil and the shell, to the chimney. When it is required, as during a temporary stoppage, to cut off the furnace gases from the coils, a damper placed between the coils and the top of the furnace controlled by a handle passing to the outside of the furnace allows of this being done. The following will serve to give an idea of the operation of the apparatus. Water is forced into the coils, and kept in circulation by means of an injector or steam pump, the water entering the coils through a feed-pipe, with a check valve at the top, and after circulating through the coils passes out at the bottom into an outlet pipe, whence it is conducted to the front of the main boiler through the stop valves, and discharged into the steam space in the form of steam. The above description refers to a single generator for one boiler, in which case the furnace is bee-hive shaped, the hot gases escaping through a contracted area at the top, the bottom portions of the coils being protected by brickwork; but where it is required to place two generators on one furnace, it is constructed more in the shape of a culvert. An intense white heat can be attained in the furnace within a very short time after starting, steam on the occasion of our visit being produced in eight minutes after lighting the fire, whilst another advantage is that, owing to the intense heat developed in the walls of the furnace there is no cooling on the introduction of fresh fuel, as it is immediately ignited from above as well as from below. In this system the main boiler acts simply as a receiver to the generator, and although fired as usual this is necessary only to a sufficient extent to maintain the normal pressure. The whole apparatus occupies only a comparatively small space and could be readily fitted in any convenient position for use with marine boilers on steamships, Mr. Hall having prepared designs for fitting up his steam feed apparatus in this manner. No additional chimney or flue is required for this steam feed apparatus and it is guaranteed to deliver with ease and certainty, into main boilers, 15 lbs. of steam feed per lb. of pure combustible used, calculating the feed water at 212 deg. Fahr. So far this steam-feed apparatus, which has been but recently perfected, has only been applied to land boilers, but where it has been used, most satisfactory results have been secured, effecting a very considerable economy in the consumption of fuel, on an average equal to quite 30 per cent. This saving in the consumption of fuel would be a very important item on steamships, especially on long voyages, as a corresponding reduction could be made in the quantity of coal which it is, under ordinary circumstances, necessary to carry, and

this, it is obvious, apart from the cost of fuel, would be a very great saving to the steamship. Amongst the other advantages secured by this system of supplying steam feed to boilers are the great reduction of labour in firing already referred to; the steam pressure being kept up with greater ease; and the existing plant not being required to be forced to the same extent; a lessening of smoke, and consumption of fuel to greater advantage. The generator needs very little attention, requiring to be cleaned out only about once a month, whilst the feed water can be supplied by means of an injector or pump direct, or if a water heater forms part of the existing plant on board ship the water can be passed through it, before going to the generators. A number of these steam feed generators have already been supplied to works in the district, and with one in operation at Messrs. Fairburn & Hall's works the following results were obtained. The fuel used was hard steam cobbles, and the generator of the furnace was fired five times during the trials, which extended over eight hours; 100 lbs. pressure was reached in 15 minutes after the start, 120 lbs. in 20 minutes, and 150 lbs. in 25 minutes, the average steam pressure during the trial being 100 lbs. The temperature of the feed water was 212 Fahr., and it was delivered into the main boiler at 350 deg. Fahr., the water evaporated per lb. of combustible being 15 lbs. During the trial all the feed from the generator was injected into the steam space of the boiler, the generator being fed by means of a lifting injector supplied with steam from the same boiler, and the temperature of delivery was 12 deg. above the temperature of the steam in the boiler. The great economy secured by the introduction of these generators into a steam producing plant, which is equal to about 27 to 30 per cent., renders it a desirable alternative plant, where additional steam power is required, in place of putting down an additional boiler, without increasing the fuel consumption, whilst it could be put in at much less cost, and also in considerably less space than an ordinary boiler. This is obviously an important advantage, especially on steam-ships where economy of space is so desirable.

### Miscellaneous.

**The Economical Transmission of Power.**—We have been favoured with a copy of the eighth edition of the above treatise, published by the Unbreakable Pulley and Mill Gearing Co., Limited, of West Gorton, Manchester. In addition to being a fully illustrated and complete catalogue of all the materials and appliances used in the economical transmission of power, the book (consisting in all of 157 octavo pages) contains some 85 pages of useful information, diagrams, tables, and formulae connected with the subject of which it ably treats. The forty-one illustrations appearing in the priced list portion of the book are evidently prepared from carefully executed photographs, and as these are in each case accompanied by all the leading dimensions, there should be no difficulty in selecting from such a list the exact article required. The company make a speciality of iron bearings carried in adjustable swivel pedestals, and after carefully going through the chapter devoted to the merits of these, we are bound to confess that the arguments used in their favour appear to be conclusive. Separate chapters dealing with shafting, couplings, bearings, toothed wheels, the general arrangement of shafting, ropes and rope drives, belting, &c., form not only interesting reading, but convey much valuable information under their respective headings. The book is neatly and strongly bound, and may be

had from the company, whose London office is at 56, Cannon Street, E.C., for the modest sum of half-a-crown.

**Tubular Boilers.**—At the Marine Engineers' Institute, West Hartlepool, on the night of November 26th, a paper on "Water-Tube Boilers" was read by Mr. Jas. Steel, of Hartlepool. Mr. A. Barrett presided over a good attendance, and in the course of a few opening remarks, said the controversy at present going on in regard to the tubular boiler as compared with the ordinary cylindrical boiler should result in some practical demonstration in favour of either the one or the other. Mr. Steel then proceeded to read his paper. The different types of water-tube boilers, he said, were very numerous. There must indeed be in existence plans and drawings of at least about 300 types of this steam generator. He described a few of the well-known types of the tubular boilers, and afterwards went on to discuss the questions whether the water-tube boiler was superior to the cylindrical boiler, and whether it was likely to replace the latter in cargo-carrying steamships. There was, he thought, certainly much to be said in favour of the water-tube boiler in regard to the I.H.P. which could be got out of a certain weight of boiler. In regard to economy, however, the consumption of coal per I.H.P. per hour was considerably heavier in the tubular than in the cylindrical boiler. The additional power obtained through the lightness of the water-tube boiler was held to make good any extra waste of fuel. That might be all right for fast ships such as torpedo boats and destroyers, where speed was everything and consumption a secondary if any consideration at all, the British taxpayer providing all the coals. But in our Mercantile Marine, which had to cope with unseaworthy foreign shipping, undermanned and overloaded foreigners, and bounty-receiving foreign lines, consumption was everything; and for this reason alone he might venture to say that, for cargo carrying purposes the cylindrical boiler was preferable, and would be extremely difficult—if at all possible—to displace for a long time to come. The repairs to the tubular boilers, though capable of being effected in a shorter time, were more costly than those to the ordinary boilers. Their construction, moreover, lent itself to the occurrence of serious and often fatal accidents. The action of the Admiralty in fitting tubular boilers would probably end as an unsuccessful experiment; but at the same time they were in his opinion perfectly justified in trying them and giving them a fair trial. We had too much at stake on the sea to allow any other Power to get ahead of us in speed of war vessels. But as to the adoption of tubular boilers in the Mercantile Marine, he thought he had said sufficient to show the undesirability of this, and the extravagant coal consumption which would ensue. A brief discussion followed the reading of the paper, and the usual vote of thanks brought the proceedings to a close.

**Hull and District Institution of Engineers and Naval Architects.**—On Monday evening, November 18th, the members of the above institution paid a visit to the National Telephone Co.'s Exchange, Bowalley Lane, at the kind invitation of the manager, Mr. E. Williamson. Mr. Williamson, after welcoming the members, gave a brief, but most interesting description of the telephone and its method of working, and also traced its history from Graham Bell's invention to the present day, at the close of which the members adjourned to the switch-room, where the ingenuity of the arrangement of the multiple switch boards now in use, excited general admiration. After inspecting these and the numerous sample of instruments, cables, bells, &c., &c., which were on exhibition, the members had the pleasure, through the kindness of Mr. Williamson and Mr. Harrison of the G.P.O., who was present, of being put in communication with several distant towns. At Belfast news of any fresh development in the trade crisis was anxiously sought, from London the operator's opinion of the various places of amusement was obtained; at Newcastle the clocks chiming the hour could be heard very distinctly; in fact the clearness of the voices at all places was wonderful. In the intervals light refreshments were partaken of at the kind invitation of the manager. At the close a hearty vote of thanks was (on the motion of the President, Mr. F. H. Pearson, seconded by Mr. G. H. Strong, and supported by Mr. Edward Dixon), accorded Mr. Williamson and all who had assisted in making the visit, one of the most enjoyable and interesting outings the members of this Institution have ever had.

**Hartmann's Rahtjen's Composition.**—The hulls of H.M. ships *Majestic*, *Magnificent*, *Illustrious*, *Mars* and *Hannibal*, have lately been coated with Hartmann's Rahtjen's composition and also half of the bottoms of the battleships *Victorious* and *Prince George*.

### NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from October 26th to November 25th, 1895 :—

Baldwin, George W., assistant engineer to the *Victory*, to date November 5th.  
 Bennington, John W., staff engineer to the *Immortalité*, to date November 19th.  
 Bond, E. A., engineer to the *Pembroke*, additional for the *Desperate*, to date November 15th.  
 Bone, Howard, engineer to the *Victory*, to date October 26th.  
 Bonneville, J. A. W., assistant engineer to the *Alacrity*, undated.  
 Broadbent, Charles, engineer to the *Narcissus*, to date November 19th.  
 Burner, William, fleet engineer to the *Pembroke*, additional for the *Blake*, to date November 13th.  
 Dalrymple, J. H., engineer to the *Vivid*, additional for the *Racer*, to date November 13th.  
 Drake, P. G., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.  
 Eyre, Charles V., engineer to the *Galatea*, to date November 5th.  
 Ferguson, Samuel P., assistant engineer to the *Narcissus*, to date November 12th.  
 Goodwin, G. G., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.  
 Green, R. W., chief engineer to the *Cordelia*, to date November 12th.  
 Haddy, Thomas J., staff engineer to the *Pembroke*, additional for Torpedo Depot at Chatham, to date November 18th.  
 Hammond, Henry T., staff engineer to the *Victory*, additional for the *Bramble*, to date November 15th.  
 Hanes, J. E., engineer to the *Medea*, to date November 12th.  
 Henwood, John W., staff engineer to the *Narcissus*, to date November 19th.  
 Hill, Charles H., engineer to the *Vivid*, additional for the *Banshee*, to date November 7th.  
 Hird, J., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.  
 Hobbs, F. D., staff engineer to the *Phæbe*, undated.  
 Ireland, Joseph H. H., engineer to the *Dragon*, to date November 7th.  
 Jones, B. W., engineer to the *Vivid*, additional, for the *Lynx*, to date November 7th.  
 Kerr, John, staff engineer to the *Tamar*, additional for the *Wivern*, to date October 31st.  
 Lancashire, Joseph E., engineer to the *Victory*, to date October 10th.  
 Lancashire, Joseph E., engineer to the *Triton*, to date November 13th.  
 Leighton, Walter, assistant engineer to the *Victory*, additional, for the *Bramble*, to date November 18th.  
 Macdonald, William, (probationary) assistant engineer to the *Narcissus*, to date November 19th.  
 Mallinson, Ernest D., assistant engineer to the *Immortalité*, to date November 19th.  
 M'Ewan, George, fleet engineer to the *Vivid*, to date October 26th.  
 M'Donald W. N., assistant engineer to the *Narcissus*, to date November 19th.  
 Moffett, E. G. P., chief engineer to the *Medusa*, to date November 12th.  
 Mogg, W. G., chief engineer to the *Vivid*, additional for the *Sirius*, to date November 18th.  
 Moore, C. A., chief engineer to the *Medea*, to date November 12th.  
 Moorshead, Herbert B., assistant engineer to the *Cordelia*, to date November 12th.  
 Morgan, Thomas J., assistant engineer to the *Phæbe*, to date November 18th.  
 Morrison, R. B., assistant engineer to the *President*, additional, to date November 5th.  
 Moysey, W. H. S., engineer to the *Mersey*, to date November 18th.  
 Olive, William, fleet engineer to the *Victory*, additional for the *Nelson*, to date November 13th.  
 Paul, Oliver R., engineer to the *Cambridge*, additional for the *Curlew*, to date November 18th.

Read, Alfred T. P., assistant engineer to the *Cambridge*, additional for the *Conqueror*, to date November 18th.  
 Rider, Sydney, engineer to the *President*, additional, to date November 5th.  
 Sawyer, Arthur F., (probationary) assistant engineer to the *Immortalité*, to date November 19th.  
 Shapcott, R. A., fleet engineer to the *Vernon*, additional, for Torpedo Depot at Portsmouth Dockyard, to date November 18th.  
 Stainton, George H., assistant engineer to the *Victory*, to date November 12th.  
 Thompson, George F., engineer to the *Phæbe*, to date November 18th.  
 Turner, Thomas H., engineer to the *Medusa*, to date November 12th.  
 Walton, J. H., staff engineer to the *Forté*, to date November 5th.  
 Watson, Lewis J., assistant engineer to the *Immortalité*, to date November 19th.  
 Wheeler, Percy, assistant engineer to the *Victory*, to date November 5th.

### HOAR & BROWN'S HARDWOOD MARKET REPORT, NOVEMBER 23rd, 1895.

TRUCK :	Timber Loads.	Planks Loads.	Blocks Loads.	Total Loads.
Stock, Oct. 18th	7,028 ..	2,588 ..	14 ..	9,580
Landings ..	1,125 ..	91 ..	30 ..	1,246
	8,153 ..	2,629 ..	44 ..	10,826
Deliveries ..	1,544 ..	343 ..	— ..	1,887
Stock, Nov. 22nd	6,609 ..	2,286 ..	44 ..	8,939

There is a distinctly improved tone, which would have been still more pronounced had it not been for the strike in the ship-building trade. As it is the deliveries of logs exceed those of last month, while the quantity taken into stock is comparatively light.

The stock of planks is still heavy, but a pleasing feature is the increased consumption, amounting during the month ending November 22nd, to 343 loads.

MAHOGANY, HONDURAS AND MEXICAN.—Not for many years has there been such an exciting rise in values as is now in progress. Every day gives fresh impulse to purchase at higher figures, and since the commencement of the upward movement, prices have risen to a minimum of 3½d., being 30 per cent. higher than last month. Quotations for large and sound wood have also advanced in a similar manner, and the medium sizes, having more scope to work upon, have risen quite 50 per cent.

CUBA.—Importers are still holding their cargoes for increased prices, but up to the present there has been little call upon available stocks and considerable quantities are still on hand at 3½d. per foot. Large-sized logs are at a premium.

AFRICAN.—A portion of the stock in first hands will be offered at public sale this month. The owners have been holding out for a full price privately, but no doubt at auction will see the policy of meeting the market. Prices are considerably inflated, but shippers are too far advanced in their ideas, as values in African have not yet reached an increase of 25 per cent., whereas they are expecting 50 per cent.

OSAGE.—Has very much advanced in value, and boat logs are greatly in demand. High prices could be obtained for anything suitable. In box-making wood the advance may be estimated at about 30 per cent. Stocks in first hands are almost nil.

WALNUT.—Logs are quiet, and although low prices are named for inferior parcels, there do not appear to be any anxious purchasers. Good shipments of 18 in. to 24 in. would sell to advantage. Lumber of extra quality is welcomed, and commands full figures, and wide stocks are still very much required, but low grades are not doing so well, and prices are likely to recede.

OAK.—Importations of lumber have met with a fairly good reception and remunerative business has resulted. Wide parcels of good quality are selling at increased values.

WHITEWOOD.—Low offers of lumber are attracting buyers just now. Medium class goods are not selling so well, and first class stocks, being small, are nearly all cleared up. Logs have

been changing hands at the lowest values, fairly good parcels having lately been sold at 12d. to 14d. Planks have been much enquired for, but stocks are light and prices low.

**KAWKIE PINE.**—Parcels continue to go off well at steady moderate values. The stocks are now increased, and are quite ample for present requirements.

**GREENHEART.**—Frequent sales have been made during the month at fair prices, but business cannot be termed active, although it has increased in volume. Stocks are large enough for the present.

## INDUSTRIAL AND TRADE NOTES.

### THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

THE dispute between the Clyde engineering employers and the society men in their employment has at last reached a head, and the struggle which most people, directly or indirectly, have been striving to avoid, has now commenced.

In accordance with the greatly discussed agreement with Belfast, the associated firms, early in the month locked out the union men in their employment, and as a natural consequence the majority of the non-union men were subsequently compelled to withdraw. It is to be feared that the struggle so wantonly precipitated by the employers will only become more bitter the longer it is prolonged. Now that war has been commenced the difficulty of bringing the contending parties to terms is intensified and liable to be complicated by incidents and influences which might otherwise never have come into play at all. That was one strong reason amongst many, why the Clyde employers should never have plunged into hostilities.

The hopes that were based on the conciliatory proposals have not, so far, been realised, and, it must be said, the immediate prospect to-day does not look very encouraging.

Already important orders for ships which would have been placed on the Clyde have been taken abroad, and it is quite probable that complications may arise with regard to some of the work actually in hand, thus further diverting future business. It is hard to say how far the struggle may go and how it may end. It is no secret that the Thames shipbuilding industry was killed by labour disputes, and the same fate is now threatening the Clyde. The lock-out will certainly cripple the trade, or perhaps deal it a blow from which it may never recover. Our worst enemy could desire nothing better than this. If the Clyde and Belfast were the only centres of the industry in the kingdom, then the lock-out, though scarcely less foolish, might at least be more intelligible. But as it is there will simply be two local disputes instead of one, and it must appear to onlookers that the Clyde employers are the victims of their own bad bargain with Belfast. Which side will win, it is impossible to predict, as the forces are so evenly matched. The Amalgamated Society of Engineers at the last statement of accounts were in possession of a balance of £200,000, and they are the most powerful workmen's organisation in the world, while the other trade unions involved are not far behind the engineers in strength. The masters, on the other hand have financial resources that are practically unlimited. It is now simply a question of a hard struggle for supremacy, and if no conciliatory proposals intervene, the fight may indeed be long and arduous, ending perhaps in the downfall of both.

The Admiralty have expressed a desire to Messrs. Thomson, of Clydebank, that they should use every means in their power to hurry forward the construction of the machinery of the third-class cruiser *Pelorus*, which is being built at Sheerness. This vessel, which is 300 ft. long, 36 ft. 5 in. in beam, and 2,100 tons displacement, was not started till the early summer, and her machinery of 10,000 I.H.P. was ordered only a month or two ago. Now, the Admiralty wish her to take part in the summer manoeuvres of next year. The idea, of course, is to gain experience with this class of cruisers and to have further trials in connection with the Normand boiler, with which Messrs. Thomson are fitting the vessel. It is believed that while the Admiralty desire to have all contract work done as expeditiously as possible, the firms on the Clyde who have Navy work on hand are not at all likely to be harassed as a result of any delay in the progress of warships, owing to the unfortunate conflict between employers and men. It is just probable that opportunity

may be taken soon of some public expressions of this view, for the Admiralty naturally wish it to be understood that no action on their part, either in hurrying forward work or enforcing penalties, should be interpreted as interfering with the arrangement between employers and men. Of course, this does not affect the desire of the officials at Whitehall to see the strike settled.

The orders for the three new first-class British cruisers were decided upon early in the month, when, as expected, the greater share of the work came to the Clyde. One is to be built by Messrs. James and George Thomson, Limited, Clydebank, another by the Fairfield Shipbuilding and Engineering Co., Govan; and the third by the Naval Construction and Armaments Co. Barrow-in-Furness. This fact at once disposes of the idea that the Government intended to distribute the work according to districts, requesting representative builders in the several districts to accept a vessel at the same price as the lowest tender. Such a proceeding is not at all in accord with commercial practice and the decision to allocate the work to the lowest tenderers must be commended from a national point of view. The new cruisers are all alike in design, although the details of machinery will differ according to the practice of the firms constructing them. Shorter than the *Terrible* and *Powerful*, they exceed in size any other vessel yet commenced. The length on the load water-line is 455 ft., and between perpendiculars, 435 ft., the beam being 69 ft. while the depth moulded is 39 ft. 10 in. Their mean draught will be 25 ft. 3 in., so that amidships they will have a freeboard of 14 ft., which is fairly satisfactory. Forward it will be greater, as in the case of the *Edgar* class. As they are called "improved *Blenheims*," it may be well to state here that that vessel and her consort, the *Blake*, are 70 ft. shorter, but only 4 ft. less beam, notwithstanding, too, that the new cruisers are to be wood-sheathed and copper-bottomed. The idea in giving greater length is to accommodate the great array of boilers, and at the same time to get high speed, for, as has been experienced in the merchant service, a good long boat is more easily driven, while a wide beam reduces the draught for a given weight. As already mentioned in last month's Notes, Belleville boilers are to be fitted. The Admiralty authorities, after the *Sharpshooter* trials, are thoroughly convinced of the success of this type, and rather than experience the disadvantages of each tenderer suggesting his own particular type decided to adopt the Belleville. There will be thirty of these steam generators, the combined heating surface being 44,800 square feet, and the grate area 1,450 square feet. The boilers will be fitted in several compartments divided longitudinally and transversely, the space occupied by boiler-rooms being 132 ft. The boilers will work under natural draught conditions, the maximum air pressure for ventilation being  $\frac{1}{2}$  in. The engines are to be of the triple-expansion type, and there will be two sets to drive separate screws. The speed with natural draught is expected to be 21 knots. In the new vessels the primary protection consists of an armoured deck rising from the sides of the ship about 7 ft. below the water line, and curving in the centre to about 3 ft. above this. This deck covers in machinery, boilers, magazines, stores, and all navigating appliances. Again, for over 200 ft. of the length of the vessel coal bunkers are arranged within the cellular construction carrying the side plating and planking, and this extends above as well as below the protective deck. The new cruisers compare well with all her probable competitors of recent design, and is equal to the *Terrible* and somewhat superior to the *Blenheim*, for the great rise of arch presents a greater thickness of plate to a projectile driven in a horizontal plane. The vessels will be started at once, and it is needless to say that each firm will do their best to deliver their ships as soon as possible.

Clyde shipbuilders were asked during the month to tender for seven twin-screw steamers for Russian owners. The vessels are intended for traffic in the Sea of Azov and the Black Sea. Among other inquiries in the market at present there is one for two large cargo and passenger steamers for a French firm of shipowners. It is understood the Italian Government were desirous of placing three gunboats and ten or twelve torpedo boats on the Clyde, but as neither Messrs. Thomson nor the Fairfield Co. could under present circumstances guarantee prompt delivery, the order will find its way to some other quarter.

Business in the Scotch iron and steel trades is largely at a standstill, owing to the uncertainty as to the outcome of the labour war. Consumers are holding back; yet it is gratifying to know that sellers are still disinclined to do much forward

business; and another satisfactory feature is that prices have not given way under the heat of an industrial upheaval on the Clyde. The steelmakers are well employed, although fresh orders are not so plentiful as a month ago.

The opening meeting of the thirty-ninth session of the Institution of Engineers and Shipbuilders in Scotland, was held early in the month in the hall of the Institution, Bath Street, Glasgow. The chair was occupied by Sir William Arrol, M.P., who delivered his inaugural address. At the outset Sir William referred to the progress of the many engineering undertakings presently being carried on throughout Scotland, and afterwards alluded to the marine engineering and shipbuilding industries. He expressed the desire to see all these trades in a more flourishing condition, and the unpleasant relations between masters and men a thing of the past. No doubt there was plenty of work and many yards were busy; but the competition was so keen that it might be asked whether the work done was paying. No doubt when many ships were turned out the effect upon some other trades was good. But it was not so with agriculture. What aggravated our great agricultural depression was our great prosperity on the Clyde. The ships launched had to be employed. They were sent to all parts of the world, and they had to compete for cargoes. These were carried for little or nothing and they consisted for the most part of food stuffs. In this way, the produce of our farmers was beat down to the lowest price. The population of the large cities certainly got cheap food and employment in building ships or making the materials for ships. The country could not exist without keen competition, he said. Shipbuilders and engineers must still try to get as many ships to construct as they could, and so we must try and find out some other remedy for agricultural depression. The meeting afterwards resumed the discussion adjourned from last session on "A new departure in steam-engine economy, with a description and tests of Field's combined steam and hot-air engine," by Professor Jamieson, M.Inst.C.E., F.R.S.E., and on "The Extension of Loch Katrine Waterworks," by Mr. James M'Gale, M.Inst.C.E.

Messrs. The Fairfield Shipbuilding and Engineering Co., Limited, contracted with the Isle of Man Steam Packet Co., Limited, during the latter end of the month, to build and engine a paddle steamer about 800 ft. long, for service to the Isle of Man. They also contracted to build a high-speed paddle steamer of about the same dimensions as the Isle of Man boat, for the Channel trade. The Fairfield Co. intended placing the engines in H.M.S. *Venus* during the month, but had to abandon the work owing to the unfortunate misunderstanding between masters and men, which has now assumed such a grave aspect.

Messrs. Mackie & Thomson, Govan Shipbuilding Yard, booked an order about mid-month, to build two trawlers for a Hull firm. The vessels are duplicates of others recently built by the same firm.

Messrs. Napier & Sons, Govan, contracted early in the month to build three steamers for the Royal Mail Steam Packet Co. These vessels will be similar in every detail to the recent additions made to their fleet.

Messrs. Charles Connell & Co., shipbuilders, Whiteinch, secured the contract to construct a new steamer to carry about 5,750 tons deadweight, to be adapted for cattle and general trade. This vessel is to the order of Messrs. William Thomson & Sons, Dundee, and is to be fitted with triple-expansion engines and Howden's forced draught. The same firm of builders also contracted to build a spar-deck cargo steamer, about 400 ft. long and of about 4,000 tons, for German owners. The vessel will be fitted with triple-expansion engines, which will be supplied by Messrs. David Rowan & Son. Messrs. Connell were also successful in booking an order from the Kosmos Steam Navigation Co. to build two of the three new steamers of 6,000 tons burden, which that company intend adding to their fleet. As all the German shipyards have already so many orders on hand that agreements could only be concluded for delivery of the vessel after long intervals, only one of these steamers will be constructed in Germany. All three vessels will be fitted with quadruple-expansion engines.

Messrs. Russell & Co., shipbuilders, Port-Glasgow, about mid-month received an order to lay the keel of a steel screw steamer of 4,000 tons carrying capacity. The same builders also contracted during the month to build a four-masted schooner.

Messrs. Robert Duncan & Co., shipbuilders, Port-Glasgow,

secured the contract early in the month to construct a four-masted fore-and-aft schooner for foreign owners. This vessel will be schooner-rigged throughout, will register 2,000 tons and will be capable of carrying 8,500 tons deadweight.

Messrs. A. Rodger & Co., shipbuilders, Port-Glasgow, booked an order during the month to build a twin-screw saloon steamer for passenger service on the river Amazon. This steamer will be 120 ft. in length, by 22 ft. beam, and will be capable of carrying 400 passengers. The machinery, which will be triple-expansion, will be supplied by Messrs. Rankin & Blackmore, Greenock.

Messrs. David J. Dunlop & Co., Inch Works, Port-Glasgow, booked an order in the fore part of the month to build and engine a steel twin-screw steamer to trade on the West coast of Africa. The dimensions will be:—Length, 204 ft.; breadth, 35 ft.; depth, 13 ft. The steamer, which will be similar to one constructed by Messrs. Dunlop three years ago, will be supplied by them with boilers and triple-expansion engines.

Messrs. Rankin & Blackmore, Eagle Foundry, Greenock, booked an order early in the month to supply the triple-expansion engines for the new steamer which Messrs. A. Rodger & Co., shipbuilders, Port-Glasgow, are constructing for the Amazon Steam Navigation Co. The same firm have contracted to make a set of triple-expansion engines of 800 H.P. for a steamer being built by the Campbeltown Shipbuilding Co.

The powerful Daimler motor launch which Messrs. J. & H. M. Paterson, Greenock, and Messrs. Paul Jones & Son, Gourcock, have designed and built respectively for the Rajah of Baroda, has just been despatched for India from Gourcock. The boat is built of teak, and is a credit to the Clyde in every way. As it is likely to be used to a considerable extent for the exploring of inland waters and rivers, there has been sent along with her a cleverly-designed and strongly-built four-wheeled truck or transport carriage. On to this the boat, when being conveyed over plains and through jungles, is firmly fixed by means of leather-bound hooks, and it is expected that wherever the elephants themselves can go, the little Clyde ship will follow them safely on its carriage.

Messrs. The Dumbarton Forge Co. during the month received an order from Messrs. Maudslay, Sons & Field, London, for the propeller shafting of the Chilean cruiser, building at Elswick shipyard.

Messrs. Fife, of Fairlie, the well-known yacht builders, have at present on hand an exceedingly large number of fresh orders amounting to about 20 yachts of various sizes, none of which, however, are of any great pretensions. For several years back, Messrs. Fife have been building up an excellent connection with the continent and the colonies, and the fact that a large number of the orders on hand are for foreign owners shows that the fame of the designers of the ancient Ayrshire yard has gone far afield. In addition to the new orders, Messrs. Fife have in hand a number of the more recently built boats to be altered to suit the new linear rule of the Yacht Racing Association, while in addition they have one of the handsomest little schooners ever seen, just about ready for launching for Mr. Frederick Lobnitz, Renfrew.

After being closed for some years the Drumpellier Iron and Steel Works, Coatbridge, were restarted during the month. In the meantime only the forge portion, consisting of eight double furnaces, has been put into operation, but is nevertheless sufficient to give employment to a large number of men.

The steam yacht *Veglia*, which Mr. Watson designed, and Messrs. D. & W. Henderson, of Meadowside, built for Baron Rothschild, left Wemyss Bay and landed her pilot at the hook of Waterford, after steaming 289 miles in 18 hours. She had a heavy sea and strong wind to contend with going down Channel, but proved as fine a boat of her class as ever left the Clyde. After coaling at Gibraltar she proceeded to Trieste to fit out.

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**Contract for Torpedo Boats.**—The Norwegian Government has accepted the tender from Schichau & Co., Elbing, subject to certain conditions, for three torpedo boats, the price being about £10,000, each, time of delivery, ten months. The displacement will be 95 tons and the speed 23 knots. There was a very material difference between the tenders, the one from Messrs. Schichau being the lowest.



## TRADE NOTES FROM THE TYNE, WEAR, TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

### THE TYNE.

**Shipbuilding.**—Since last month a livelier tone has begun to be manifested, and enquiries for new tonnage have increased considerably. Owing to an advance in the price of material, builders have been compelled to raise their quotations somewhat, and great difficulty has resulted in fixing contracts, even in cases where negotiations had been commenced. Despite the inevitable "haggling," however, which such a state of circumstances gives rise to, a number of important orders have been placed in the district, and it is said that the fixing of several others is only a question of days. It is worthy of note that most of the tonnage ordered to be built within the past few weeks on the Tyne and Wear is for foreign account, and the statement has received currency that the work has drifted here because the whole of the German yards are full. Though this may contain a substratum of truth, it is not all the truth; for foreign orders have been placed on the two rivers named at times when there was no work in the German yards, and it may with justice be assumed that a portion of the foreign ordered work now in hand here would have found its way to the district, no matter what the state of business in the continental establishments. Foreign tonnage has always constituted a material part of the work turned out from Tyneside yards, and it is not wonderful that what has happened in other years has also happened in this. The most important contract booked during the month, is one for three large steamers for the Hamburg and South American service, secured by Messrs. the Palmer Shipbuilding and Iron Co., of Jarrow. The vessels will be fitted up on a scale of great completeness for the conveyance of both passengers and cargo, and the machinery will be supplied from the Palmer Co.'s Engineering Works. The performance of the torpedo-catcher *Lightning*, on the occasion of her official trials, has redounded greatly to the credit of the Palmer Co., by whom she was built, and general regret has been expressed that subsequently she had to be laid up in dock as the result of a collision with a cargo steamer. The company have indeed been very successful with all their Government contracts, and it is hoped that the Admiralty will give the circumstance due consideration when next there is any work to be given out.

Messrs. Armstrong, Mitchell & Co. are said to have secured orders for two other battleships similar to that now on the stocks of their Elswick establishment (and nearing completion) for the Japanese Government. The company are also understood to have booked some good orders for their Low Walker Yard, and considerable stir is being manifested in the initiatory departments at the latter place. Among the orders in hand at the yard of Messrs. Wm. Dobson & Co. is a vessel of 8,500 tons carrying capacity, ordered by Messrs. G. & C. R. Bell, Prudential Buildings, Newcastle.

Messrs. Wigham Richardson & Co. have been commissioned by the Cork Steam Shipping Co.—for whom they have already built one or two handsomely-designed and admirably-equipped boats—to build a passenger steamer of moderate size, the machinery for which will be supplied by the builders. The firm have four or five other vessels in progress, and are on the whole very busy. There is reason to believe that Messrs. Hawthorn, Leslie & Co. have received another important order from Russia, the work to be done this time being the construction of a large pontoon dock. In this connection, it may be stated that the pontoon dock which is being built for Messrs. The Smith's Dock Co., of North Shields, at Messrs. C. S. Swan & Hunter's, is well advanced towards completion, and will be ready for launching in three months from now. This pontoon will be capable of accommodating vessels up to 6,500 tons carrying capacity, and will be the largest in existence, with the exception of one now being built at the yard of Messrs. Blom & Voss, Hamburg. The uses of electricity have been greatly multiplied at Messrs. Swan & Hunter's within the past few months, and a very large proportion of the hoisting work is now done by this economical and most effective medium. A certain amount of unskilled labour has been temporarily displaced by the adoption of improved methods, but it is probable that whatever loss may have been inflicted on local labour interests by these changes, will be more than counterbalanced by the increase in work coming to the yard.

Messrs. Robert Stephenson & Co. have contracted with the owners of the Barry Dock Co. for the building of a large caisson, to be used in the entrance way of a new wet dock, now in the course of construction. The caisson will be of exceptionally large size, and will involve the employment of a very great amount of angle-smith work. The firm have also been commissioned to build a hopper barge on local account, and have some work in hand for the Montrose Harbour Commissioners. At the Tyne Shipbuilding Co.'s yard business is still active, and we hear that one or two additional orders have been booked.

Messrs. Readhead's establishment is also kept busy, and a keel has been placed in a recently vacated berth. We understand that the Scotswood yard is practically dismantled. At a sale of effects which took place there lately, a number of the best machines were specially reserved by the representative of the company, and were subsequently shipped to South America, where it is said the company contemplate resuming the building of river passenger steamers.

**Engineering.**—In the larger marine engine works business is more active, and at one or two establishments night work has been commenced. The Elswick ordnance works and steel works are distinctly busier, and locomotive works are showing signs of improvement.

Messrs. Clarke, Chapman & Co. continue to be well employed in both the electrical and general engineering departments, and their boiler shops show a fair degree of activity. Messrs. Henry Watson & Sons, of the High Bridge, Newcastle, and Walker Gate, are doing a satisfactory business, and the sales of some specialities of which they are the manufacturers, are showing a steady increase. Especially is this the case with the Patent Deck Plates, having "thief-proof," watertight, non-detachable plugs, in respect of which the firm and Mr. M. O. James, shipbuilding inspector of the Prince Line, are co-patentees. These useful accessories are becoming very popular, and have been adopted on a great many first-class steamers, including the vessels of the Russian Volunteer Fleet.

Messrs. Ernest Scott & Mountain, Limited, have the extensions in connection with their works nearly completed, and it is understood that the firm have a great amount of work to go on with, when the new departments are ready.

Messrs. Higginson & Co. have, during the past few months, fitted completely with their well-known steel blocks, new steamers at the yards of Messrs. Wigham Richardson, W. Dobson & Co., Armstrong, Mitchell & Co., and the Palmer Shipbuilding and Iron Co., Limited. Among the vessels fitted was the large warship *Buenos Ayres*, built at the Elswick yard to the order of the Argentine Republic, and also the s.s. *Borneo*, built at Jarrow for the P. & O. Co. The firm are doing a large business in this district with their self-lubricating wrought steel cargo blocks and gins, which are now being used for the equipment of steamers belonging to the principal local firms. Mr. E. Smith is the manager of the Newcastle branch, which is situated at No. 32 Side.

Messrs. R. Bowran & Co., 3, St. Nicholas Buildings, have recently sold to Messrs. J. L. Thompson & Sons, Sunderland, a "Stockport" gas engine of the very largest class, which is to be used for driving part of the shipyard machinery. The firm have also sold a "Stockport" engine (for which speciality they are the local representatives) to the Sunderland Forge Co., and a number of smaller engines to other firms. They have also just fitted a large building in Newcastle with an installation of Blackman's drying and ventilating system.

At the works of Messrs. George Angus & Co. business is showing some improvement, the demand for their packings, valves, and other engineering specialities in india-rubber, having been stimulated by the increased activity in shipping. The firm's foreign trade is steadily expanding, a circumstance which has contributed in no small measure to the improved state of business in the works.

Mr. W. F. Snowdon, the local agent for Bell's Asbestos Co., has done a good deal of boiler-covering work lately, on steamers built on the Tyne and at Hartlepool.

**Electric Lighting.**—Messrs. J. H. Holmes & Co. have several important ship installations in hand just now at Tyneside yards, among which may be mentioned the s.s. *Kherson*, built for the Russian Volunteer Fleet by Messrs. Hawthorn, Leslie & Co. The lighting installation on this vessel—which, it may be remarked, is the longest ever launched on the Tyne—consists of 300 lamps, and the firm are also fitting a system of electric

fans for ventilating the vessel throughout. There are three generating plants, each consisting of an engine and dynamo coupled together. Any two of these plants are capable of supplying the whole of the current required for lighting and ventilation, so that in the event of an accident occurring to any part of the machinery, the maintenance of adequate generating power will be assured. The whole of the engines and dynamos are placed in a special engine-house on deck, where also a main switchboard is fitted, to control the various circuits. The firm are also lighting, at the yard of Messrs. J. L. Thompson & Sons, Sunderland, a steamer of superior class, ordered by Liverpool owners, and another at Messrs. Raylton Dixon & Co.'s yard, Middlesbro', ordered by London owners. The firm have also a number of contracts for land installations, among which may be mentioned a very extensive one at the Moor Steel and Iron Co.'s Works, Stockton, which is now nearly completed. They have also just finished an installation of 200 lights, in the Co-operative Society's Printing Works, Newcastle.

### THE WEAR.

**Shipbuilding.**—At the North Sands Yard (Messrs. J. L. Thompson & Sons) the state of business is still good, the whole of the berths being occupied and frame turning being continued in full swing. The firm are now engaged in making alterations in both offices and workshops with a view to meet steadily increasing requirements. It is nothing new to state that this firm are altering or adding to their premises; for during many years past they have continued to do so almost without pause, new requirements becoming manifest from time to time as business grew and experience ripened. The result of these unwearied efforts to bring the establishment and its accessories to the highest possible condition of effectiveness is that the yard is now known as one of the most admirably equipped on the North East Coast, and is second to none in the characteristic of being able to turn out work quickly and economically. It is due to the firm to mention these matters, as theirs is the kind of indomitable spirit which has so far kept this country at the head of industrial nations, and which has provided our overflowing population with employment.

There is now being delivered at Mr. Laing's yard, Deptford, a set of plate bending rolls by a Glasgow maker, which are probably the largest that have yet been manufactured. The rolls proper are 33 ft. long, the top roll being nearly 3 ft. in diameter, and weighing 21 tons, while each of the bottom rolls (which are much smaller in diameter) weighs upwards of 10 tons. The rolls will be capable of dealing with plates up to 32 ft. in length, which may be regarded as the extreme limit of length at which ship plates are likely to be manufactured. However desirable it may be to lessen the number of joints in ship plating, plates beyond the length named are practically unworkable, as when greater lengths have been tried, the increased expense of fitting them has been found to far outweigh any advantages otherwise obtained. Mr. Laing has a fair amount of work on the stocks, and it was rumoured lately that he had secured an important Russian order, but the report has been contradicted. It is known, however, that there are a number of Russian boats in the market at this moment, and the chances are that some of them, at all events, may come to be built at the Deptford yard.

Messrs. Doxford have launched a second "turret" ship for Messrs. Ritson & Co., of Sunderland, a firm who have taken most kindly to this special type of vessel, and who apparently contemplate having all future vessels required by them built on this design. There are now eighteen "turret" ships afloat, and considering the short time that has elapsed since the introduction of the type, this may reasonably be regarded as a distinct success. The firm have other "turrets" in various stages of progress on the stocks, besides a number that are to be put in hand as soon as berths become vacant.

At Messrs. Short Brothers' yard business continues very active, a state of affairs which is equally noticeable at Messrs. Priestman & Co.'s yard opposite. The latter firm have recently secured an order for two large vessels from Norwegian owners. The other yards at Southwick are short of work, the establishment of Messrs. R. Thompson & Sons being the worst off in this respect. The two yards at the South Dock are now tolerably busy; but at Messrs. Blumer & Co.'s yard (North Dock) there is little doing, and the same may be said respecting

Messrs. Austin's yard, so far as new work is concerned. The latter firm, however, have important repair contracts in hand, one vessel, which is in their graving dock, having the greater part of her hull in course of being renewed.

**Engineering.**—Much apprehension has existed in this district as regards the possibility of the larger local works becoming involved in the dispute which is now doing so much damage on the Clyde, and at Belfast. So far as we have been able to ascertain there is not much probability of such a misfortune occurring immediately; but there is every reason to believe that, if an early solution of the difficulty pending in the districts named, is not arrived at, steps may be taken by the engineering employers of the North East Coast to assist in some practical way the firms who are now contending with their men in Scotland and Ireland. This is not the place to discuss such a momentous matter; but without going into the merits of the case, we may state the fact that, in view of the serious peril threatening the trade of the country, a strong feeling exists in favour of the employers in different districts forming a permanent alliance for defensive purposes. In furtherance of this movement, a conference of engineering employers, representing the Clyde, Belfast, and the North East Coast, has just been held at Carlisle, and the outcome of this will probably be the arrival at some such understanding as that indicated.

The Wearside engine-works are, on the whole, rather better employed than they were at midsummer—and, as foreshadowing further improvements, we may state that foundries are very much busier. At the Monk Street Foundry overtime has been largely resorted to of late, and several other establishments of the same description are having increased business.

Messrs. Jamieson & McColl, of the Wreath Quay Engine Works, have obtained an order for a set of engines of about 400 H.P., which are intended for a small coasting steamer now in course of construction on the Wear. The firm will also supply the boilers, having provided hydraulic riveting plant suitable for the execution of this class of work in the most effective and economical manner.

At the works of Mr. A. A. Rickaby the state of business is satisfactory, orders for piston rod packing, piston rings, &c., being sufficiently numerous to keep the machinery fully going.

Messrs. John Lynn & Co. of the Luke Street Engine Works, Pallion, are well supplied with orders for steam winches and other specialities and their works continue to be kept quite busy. The Sunderland Forge is also actively employed, and with a view to further increase productive power, a "Stockport" gas engine of 70 H.P. (approximate) is being put down.

Messrs. Wawn & Wilcox, consulting engineers, of Norfolk Street, Sunderland, have, during the present year, fitted a large number of steamers with their patent propellers. These propellers have now been in use a sufficient time to adequately test their value and the result seems to be in every way confirmatory of the claims set forth in respect of them by the patentees. Another locally introduced speciality which has been received with much favour, and which is being rapidly adopted, is the new type of ship's ventilator patented by Messrs. Brown & Mitchell, of No. 6, Athol Road. This article appears to be admirably adapted to the purpose indicated by its name, and its sale has already exceeded the expectations of the makers.

**The Hartlepool.**—Shipbuilding at this centre is fairly active and rumours of additional orders having been recently booked are current. Besides the new work in hand there is a considerable amount of repair work in the port. The engineering works of Messrs. Thomas Richardson & Sons show a continuance of steady trade, and in some departments considerable briskness is apparent. A good demand is being experienced for Morison's "Safety Liners" for propeller shafts, and also for Morison's "Evaporator." The Central Marine Works keep pretty busy, and during the first half of November two vessels that were engined at the works have had successful trials. These were the s.s. *Marie Elsie*, and the s.s. *Firby*, the first of which has engines of 1,100 H.P., and two large steel boilers constructed to work at a steam pressure of 160 lbs. The second vessel, being of considerably smaller dimensions, has engines of correspondingly smaller capacity and boilers to suit. We may add that Mr. Mudd, the respected manager of the works (and now a director), has been elected Mayor of Hartlepool.

**Stockton.**—The state of work at the shipbuilding yards of Messrs. Ropner & Sons, and Messrs. Craig, Taylor & Co. is

satisfactory, and a good many additional hands have recently been set on by the last named firm. Messrs. Blair & Co. continue to have a good deal of work in hand, and at most of the boiler-making works business is good. The Malleable Iron Co.'s works are kept in full swing, orders for ship and boiler plates being rather plentiful. The Moor Steel and Iron Co.'s works are also kept fully going.

**Middlesbro'.**—Messrs. Raylton Dixon & Co. have their ship-building berths pretty well occupied; but at the other yards the work in hand is limited. Engineering works are showing improvements, and steel works are better employed. Iron foundries are also becoming busier.

**Consett.**—The works of the Consett Iron Co. are just now showing more briskness than at any previous time during the present year, and the weekly output of plates and bars is much above the average.

## THE MERSEY.

(From our own Correspondent.)

THE continuance of the shipbuilding dispute on the Clyde and at Belfast, and the probability of a protracted struggle, which may possibly extend to other centres, has necessarily an unsettling effect upon the iron and engineering trades of this district, not so much because engineering firms in this neighbourhood are likely to be involved in labour disputes with their men, but chiefly because the protracted stoppage of operations in other extensive centres of industry must necessarily for the time being throw a good deal of material on the market, and help to bring down prices. This is causing consumers to hold back from purchasing further, and to go on simply with the iron they have to come in, and although makers who have mostly sufficient orders on their books to carry them well into next year, hold firmly to the full list rates, there is a good deal of underselling amongst merchants and dealers who are either prepared to "bear" the market, or where they have low-priced contracts are letting them go, to secure what business there is to be got at under makers' prices.

Messrs. Laird Bros., of Birkenhead, have, during the past month, been making good progress with the mail packets for the City of Dublin Co., and the battleship *Mars* is being pushed forward for delivery before the contract date. The firm have also launched, during the past month, the *Thrasher* and the *Virago*, two of the four thirty-knot torpedo destroyers ordered by the Admiralty in May, the other two of which have previously been launched. These vessels, which include the *Quail*, *Sparrowhawk*, *Thrasher*, and *Virago*, are now being rapidly pushed on towards completion, and it is expected that the first named will shortly be ready for steam trials. A further trial of the torpedo-boat destroyer *Dragon* has also taken place. This vessel, of which particulars have already been given in these columns, steamed at the rate of 27 knots per hour, in her trial over Maplin, which she went through in a very satisfactory manner. The *Banshee* and *Lynx*, which are at Devonport, are to be put in commission for the 7th of this month, for the purpose of giving instructions to various engine-room ratings in the working of water-tube boilers. The *Ferret*, we may add, has already been very successfully employed on this service.

The position in the general engineering trades of the district continues satisfactory. During the early part of the month there was some tendency to quieten down, but new work seems now to be coming forward rather more freely, and most departments are well supplied with orders. A good deal of special work has been booked by machine tool makers, whilst stationary engine builders continue well engaged, and boiler-makers are fairly busy. Locomotive builders also report a slight improvement, and in general engineering operations there is a considerable amount doing.

The usual monthly returns of the engineering trades union societies are of course largely affected by the disputes on the Clyde and at Belfast, which have thrown a large number of members out of employment, but independent of this there is a slight decrease in the out-of-work list. No definite estimate can be given of the total number of unemployed members on the books of the Amalgamated Society of Engineers, but in

this immediate district it remains practically the same as last month, with a tendency to diminish, if anything. The Steam Engine Makers' Society, although of course affected by the dispute, has only about 8 per cent. of its total membership on donation benefit. As regards the state of trade reports generally are of a satisfactory character, and indicate a continued hopeful outlook for the future. No change, either in one direction or the other, is reported from most of the marine centres.

At a recent meeting of the Manchester Association of Engineers, Mr. Joseph Butterworth, manager for Messrs. Lancaster & Tonge, the well-known makers of the "Lancaster" piston, read a very interesting paper on "Pistons and Piston Valves." In the course of it, he described the earliest forms of pistons, the experiments conducted by Ramsbottom to determine the correct form of the piston-ring, the conditions under which piston packings act, and the different types of packing at present in use. One-half the designers of pistons, he said, went to a great deal of trouble to keep the steam from the space behind the piston packing, whilst the other half were just as anxious to get it there. Mr. Goodfellow's packing, invented in 1838, might fairly be regarded as the forerunner of the modern type of piston, and modern engineers appeared generally to aim at the results obtained by Mr. Goodfellow by means of springs of various forms, although few were agreed as to which of the many designs was the best. With regard to the different methods of fastening the pistons to the rods, he thought the nut would eventually be the only recognised fastening, as the cast-iron piston would probably be supplanted by the mild steel ones, the most convenient form of which was a flat, truncated cone, which was most suitably fastened with a nut. Its introduction into land practice would, however, be deferred until steam-engine makers jacketed all their cylinder covers. Referring to piston valves, Mr. Butterworth said few attempts had been made to adopt them in land engines, probably owing to the difficulty of keeping them steam-tight, but they were very largely used in marine practice, the low pressure cylinders having two valves, as a rule, to give a large area of ports compared with the size of the valves. In course of discussion on the paper, Mr. W. H. Hunter, engineer to the Manchester Ship Canal, referred to the objections raised by many engineers to the use of piston valves. He had recently spent considerable time in deciding upon the best piston valves for two sets of triple-expansion engines which he was putting in at a new hydraulic installation at the Manchester Docks. Mr. Butterworth, in replying upon the discussion, observed that piston valves had certainly been subject to many objections, chiefly, however, owing to bad workmanship. With regard to solid rings, he had seen thousands lying about in large shipbuilding yards for vessels of the *Campania* class, so that they were no doubt the latest practice.

A drilling machine, containing several improvements, has just been brought out by the executors of T. Atkinson, of Accrington, and a short description may be interesting. The machine is double-gear, with fast and slow speed, to drill holes with ease up to 1 in. diameter, with planed bed-plate containing slots, to allow the machine to be drawn forward when drilling larger sizes. A patent feed-motion by cam arrangement is also introduced, in which a catch is pressed down behind the small hand-wheel, and the cam is brought into or out of gear with a tooth wheel, as the case may be, and when it is out of gear the wheel can be worked up or down. This improved feed-motion renders the machine much more regular in its action than the ordinary bench drills, worked with a picking feed, the irregularity of which causes the breakage of drill-bits, rough holes, and unsteadiness in turning the fly-wheel. The vices supplied with this drill are fitted with right and left-hand screws, and jaws opening from and closing to the centre, so that when the vice-jaws are set to the centre of the drill-bit, any size of circle that the vice will take in can be drilled in the centre. The vice has slots on the side, allowing it to be moved on the table or bed-plate, and can be supplied with V or straight steel jaws.

Although in pig-iron only a slow business has been coming forward during the past month, and there has been some underselling, the position of makers continues quite as strong as ever, and they are so fully booked over the next few months that they are not only under no necessity to seek further orders at under current rates, but in many cases indifferent about booking business at all just now. There is also a belief that as soon as the shipbuilding dispute is over, and buyers come again into the market, prices will move upwards. In local and district

brands of foundry pig-iron, makers hold firmly to the rates quoted last month, Lancashire remaining at 46s. less 2½, Lincolnshire, 48s. 6d. to 44s. net cash, and Derbyshire, 45s. 6d. to 47s. 6d. net cash, delivered Manchester, with no underselling to any appreciable extent, but only a slow business doing at the above rates. In forge qualities, Lincolnshire makers have booked some fairly large orders, on which they have been able to secure their full quoted rates, which average about 41s. 6d. net cash, delivered Manchester. Outside brands offering here have shown a weakening tendency during the past month, owing to the fluctuations in the warrant markets, which have caused some irregularity in prices for Middlesbrough and Scotch iron, merchants in some cases offering at very low figures. For good foundry Middlesbrough makers quote about 47s. 4d. net cash, delivered Manchester, but in the open market sales have been made at 1s. or more under this figure. In Scotch iron, there have been sellers of Eglington at as low as 47s. 3d., although others hold to 47s. 9d., whilst makers quote 48s. net prompt cash, delivered Lancashire ports.

In the manufactured iron trade makers have been booking a large weight of orders during the month, especially in bars and sheets, in which they are generally fully booked over the next three months, and prices continue strong. Lancashire bars are not quoted under £5 10s., with 2s. 6d. more asked for anything like forward delivery; whilst North Staffordshire bars are quoted £5 15s. as the minimum, and good qualities of sheets range from £7 10s. to £7 15s. delivered Manchester district. In hoops, there has not been so much business stirring as in bars and sheets; but Association lists rates remain steady at £6 2s. 6d. for random, to £6 7s. 6d. for special cut lengths, delivered Manchester district, and 2s. 6d. less for shipment.

In the steel trade there has been rather a falling off as regards the weight of business doing, although a fair demand is reported for structural material. Prices in some directions have eased down considerably; good ordinary foundry hematites could now be bought at 56s. to 56s. 6d. less 2½d., with good steel billets, £4 7s. 6d. to £4 10s. net cash. In boiler plates Scotch makes have been offered here at very low figures, with the result that local makers' prices have moved downwards, £6 5s. to £6 7s. 6d. being now about the average figures for delivery in this district.

A quiet tone prevails in the metal market, the weight of business put through being only moderate, buyers having held back in the expectation of a reduction in the list rates for manufactured goods, owing to the weak tone in raw material, with the close of the month there has been a giving way of ½d. per lb. in brass and copper wire and brass sheets, and ¾d. per lb. in yellow metal plates, list rates for delivery in the district being now as under:—Solid drawn brass boiler tubes, 6½d.; solid drawn copper tubes, 7½d.; brazed copper gas and steam tube, 7½d.; brazed brass gas tube, 6½d.; brass wire, 5½d.; copper wire, 6½d.; rolled brass, 5½d.; sheet brass, 6½d.; and yellow metal condenser plates, 4½d. per lb.

A better feeling prevails in the timber trade. Imports have been only moderate, and deliveries fairly satisfactory, with stocks not too heavy, and prices consequently are steady, with a hardening up in some articles. In East India teak both logs and planks continue to arrive too freely, with stocks ample; but there has been a fair demand and prices are unchanged. Only one cargo of greenheart has arrived, and with a good consumption stocks are kept within moderate limits.

There has been rather a quietening down as regards the demand for house coals, in which there is only moderate business doing, and pits are now in many cases only working four days a week, whilst prices, except that they have hardened up to full list rates, have shown no actually quotable advance, best Wigan Arley remaining at about 10s. 6d.; seconds Arley and Pemberton four foot 9s. to 9s. 6d.; and common house coals 7s. to 7s. 6d. at the pit mouth. Steam and forge coals continue in but slow request, although more business is doing for iron-making requirements. Supplies are excessive, and prices continue very low, 6s. to 6s. 6d. being the full average pit prices. For the better qualities of engine fuel a fairly active demand is reported, but the inferior sorts are a drug on the market, with prices unchanged at about 8s. to 3s. 6d. for common, and 4s. 6d. to 5s. for better qualities, at the pit mouth.

For shipment business is very quiet, with no improvement in prices, ordinary steam coal being obtainable 7s. to 7s. 6d., delivered Garston Docks or High Level, Liverpool, and 7s. 6d. to 7s. 9d. delivered Partington tip, Manchester Ship Canal.

## BELFAST TRADE NOTES.

(From our own Correspondent.)

THERE is little or nothing to report this month from this quarter. The engineers' strike still drags on its weary course, and, despite the best endeavours of various well-meaning parties, seems as far from a settlement as at the beginning of the dispute. There seems at present to be every probability of its spreading to the North-East Coast of England, as during the present week the Clyde and Belfast masters have been in consultation with representatives from the Tyne, Tees, Wear, &c., on the subject. As yet their decision remains private. Should a general lock-out be resolved on, it will practically paralyze the engineering and shipbuilding industry in the United Kingdom.

The ironmoulders are also standing firm in their demands, which do not seem at all likely to be conceded by the masters.

No launches have taken place from Messrs. Harland & Wolff's yard this month. The s.s. *Hyson*, a large steamer for Messrs. The China Mutual Steam Navigation Co., Limited, was launched from the North yard of Messrs. Workman, Clark & Co., Limited, on Wednesday, 20th ult. This vessel was mentioned in last month's Notes as having been launched last month; in the ordinary course of events, such would have been the case, but at the last moment she was put back on account of the strike.

The s.s. *Vedamore*, recently launched by Messrs. Harland & Wolff for the Johnston Line, of Liverpool, is at present lying at the 100-ton crane, having engines and boilers put in. The engine work is being done entirely by apprentices. Her date of completion is uncertain.

The s.s. *Cestrian*, for Messrs. Leyland & Co., and the s.s. *Historian*, for Messrs. S. and J. Harrison, are still more or less incomplete.

The repairs to the White Star steamer *Doric* are also far from being finished yet.

In the early part of the month, Messrs. Workman, Clark & Co., Limited, despatched two vessels within a few days of each other. These were the s.s. *Centaur*, for Messrs. Alfred Holt & Co., Liverpool, and the s.s. *Mourne* for local owners. Both steamers ran successful trial trips, and after adjusting compasses in Belfast Lough, proceeded to their respective destinations.

The Irish Lights Commissioners paddle steamer, *Princess Alexandra*, has also left this port during November, after receiving a thorough overhaul to both ship and engines from the same firm.

Messrs. Combe, Barbour & Combe also recently despatched a large set of engines for a spinning mill in Russia. They have on hand at present a number of similar engines, one of these being of 600 I.H.P. for a large spinning mill in the neighbourhood of Belfast. Their apprentices have decided to throw in their lot with the strikers.

The Belfast coppersmiths are now only working half time.

Altogether the output here is much below the normal, and the outlook for the winter is gloomy indeed.

## NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

Barrow-in-Furness.—The most important feature of news this month in the shipbuilding industry of this district is the reception of the order from the Admiralty for the building of the first-class cruiser *Niobe* by the Naval Construction and Armaments Co. The order was especially acceptable at this time, because work on the shipbuilding side of the yard was getting very low, and very little if any commercial work was offering at prices which would afford a profit to West Coast builders. Only two commercial steamers are building at Barrow, both for the Clan Line, and they will soon be launched and off to sea. Prior to the new order for a first-class cruiser, the only other work on hand in the Barrow yard was the building of two second-class cruisers for the Admiralty, the *Juno* and the *Doris*. The first of these has been launched during the month, and the *Doris* is fully plated and will be launched sometime in January next. It is evident, viewing the present position of the shipbuilding department of the Barrow yard, that several additional orders are required to fill up the vacant ways. The *Niobe* is about to be laid down on the ways where the *City of Rome*, *Normandie*,

*Empress of India*, and the *Powerful*, were built. There is, however, room in the Barrow yard for ten or a dozen ships at one time of the size of the big first-class cruisers, and there is a general desire that some day or other line-of-battle ships will be built here. The yard is of a hard nature, and could hold in any part of it with perfect safety the heaviest ship which could possibly be built. There is the further fact that the launching area is the best in the world. Walney Island acts as a splendid breakwater, and there is launching room in front of the yard fully a mile across, into which the heaviest man-of-war or the largest "liner" could be launched with perfect safety. When launched all vessels at Barrow are taken into the docks and placed under the 100-ton hydraulic crane in the Devonshire Dock, where the engineer, boilers, &c., are fixed, alongside the great engineering and boiler shops. At present in the Devonshire dock are H.M.S. *Powerful* and H.M.S. *Juno*. The engines of the *Powerful* are finished and the starboard engines are already on board, while the port engines are ready for being lifted in. About 40 of the Belleville boilers have been tested and fixed, and the rest are completed and ready for being fixed—so that in course of a short time the machinery in the cruiser will be ready for turning round in the dock trials. The boilers and engines of the *Juno* are ready to be lifted aboard the cruiser, and practically all this work will be done by January next, when the *Doris* will be round alongside her sister ship for her engines and general fittings. Much experience in the building of Belleville boilers for the *Powerful* has been acquired, and this will serve the company in good stead in the boilers of a similar type, with which the *Niobe* has to be fitted. The *Powerful* will be ready for delivery about the autumn of next year. It is rumoured that cruisers and other war vessels for other powers are in the market, in the building of which Barrow is expected to take part. There is not, however, much demand for new commercial tonnage, although there is a prospect of some big schemes maturing shortly, which will probably lead to some big orders in the best and largest class of work for Barrow. During the month the *G. B. Crowe*, the second sand-pump dredger built for the Mersey, was delivered to the Dock Board, and in her trials at dredging, speed, &c., has come up to the fullest expectations of her builders and owners. In many respects she will prove a better dredger than the *Brancher*, as the latter has been improved upon by the experience gained in her work. The *Brancher* is likely to come to Barrow to be thoroughly overhauled when the *G. B. Crowe* is placed on her station. The Naval Construction and Armaments Co. have been asked to tender for two of the 30-knot torpedo-boat destroyers, of which eight are still required by the Admiralty to complete last year's programme. The tender has gone in and it is probable that two, if not more, of these boats will be ordered at Barrow as three already completed, here of the 27-knot class have come out with wonderfully satisfactory results. Gradually the Barrow yard is beginning to assume more and more the characteristics of a naval dockyard, and special machinery for dealing with the highest class and heaviest features of Admiralty work has gradually been added to the facilities at the command of the N. C. and A. Co. It is quite on the cards that at some time in the near future an additional department will be added to the company's operations: that of producing armaments. No better place exists in the country for the manufacture of either heavy steel plates or guns, as the iron ore from which the best steel is made lies abundantly in the bowels of Furness. There is a big future for Barrow if advantage is taken of the natural facilities which abound in the district, and of the splendid harbour and docks which would find shelter for practically the whole of the British Navy. Whether these developments will take effect under the auspices of the present company, or whether new concerns are started, it is impossible at present to say, but there is a growing demand for heavy plates and guns, and it is felt that with only about four firms at present engaged in these departments of trade, there is not only much immediate scope for successful and profitable enterprise, but that the near future will afford still greater scope for a brisk and active trade in the manufacture of the armour of the ever-increasing navies of the world.

**Shipbuilding Material.**—There is a fair demand for ship and boiler plates, and for shipbuilding sections generally, and although the works at Barrow have been closed for three months on a wages difficulty, which now is practically settled, work is to be resumed in the first week of December, and it is known that makers have in hand plenty of orders to secure a very active

business during the whole of next year. There are now two plate mills at the Barrow Works, and a third is in contemplation. There is a brisk trade doing in heavy steel castings, and this is a department of work which is also being undertaken by the Moss Bay Co. in Cumberland. There is every prospect of a good business being done on the West Coast of England in pipes and tubes if works were established, as the local demand for this material is very brisk, and is likely to grow now that so much attention is being devoted to the building of water-tube boilers.

**The Hematite Trade.**—There is a good trade doing in hematite qualities of pig-iron and prices are well maintained. There are, however, only thirty-six furnaces out of seventy-five in blast, but prospects are so good that preparations are being made all over the district to re-light furnaces, which for a long time have been idle, and it is probable that next year will be one of the busiest years experienced for some time past in the hematite iron trade.

**New Atlantic Greyhounds.**—It is now definitely known that the North German Lloyd Co. has placed its order for a pair of fast twin-screw mail steamers for their New York trade. It was, however, incorrect to state that Fairfield had received the order. The assumption was, perhaps, a natural one as the firm had built for the Line such vessels as the *Elbe*, *Eider*, *Saale*, and *Lahn*, and the sisters of these ships. But consideration of policy, and, perhaps, a fear lest labour troubles might delay the completion of the vessels if built on the Clyde, intervened, and the Vulcan Co., of Stettin, has the order for one vessel. Their work is, of course, already well-known in the trade, where they are represented by such fine vessels as the *Kaiser Wilhelm II.*, the *Havel*, and the *Spre*, of the North German Lloyd Co., and the *Augusta Victoria*, and the *Furst Bismarck* of the Hamburg American Co. The other vessel, however, is placed with the firm of Mr. F. Schichau, of Elbing, and their work will be peculiarly interesting from the fact that they are new competitors in the field. Their speciality has hitherto been the building of small, fast boats. It is as though a British firm got Messrs. Yarrow or Thornycroft to build their version of a *Lucania* or *S. Paul*. The new vessels are to be about 600 ft. long, and of a speed about equal to that of the crack Cunarders. But they are not to be sisters, the designs of the two contracting firms being far from identical. This will lend an exceptional interest to the performances of the new steamers.

**Screening of Ships' Side-lights.**—The *Shipping Gazette* and *Lloyd's List* publishes the substance of the report of the departmental committee appointed by the Board of Trade to inquire into the subject of the screening of ships' side-lights. The Order in Council of January 30th, 1893, professed to secure compliance with the international regulations affecting the screening of side-lights by providing that the rays from the red and green lights must be screened to an angle of four degrees from the outside edge of the wick. The position taken up by the shipping interest was that this requirement constituted a serious danger to navigation, and was calculated to increase rather than diminish the risk of collision. After expressing their acknowledgments to the officers of the Board of Trade for the very able and candid manner in which they placed their information and opinions at the service of the committee, and their obligations to the secretary, Mr. Hipwood, of the Board of Trade, the committee conclude their report in the following terms:—"In conclusion the committee make the following recommendations, which are limited to the matters directly involved in the questions submitted to them:—1. That the Order in Council of January 30th, 1893, be cancelled. 2. That in the case of oil lamps the forward edge of the screen, or chock on it, should be in a line parallel to the keel with the inside edge of the wick. 3. That in the case of electric lights there should be a similar screening in regard to the inside edge of the filament. 4. That the breadth of the wick of oil lamps, and of the filaments in the case of the electric light, should be not more than two inches nor less than one inch, measured at right angles to the fore and aft line of the ship. 5. That the visibility of the green light should as nearly as possible be equalized to that of the red by the employment of higher candle-power; and that the masthead light should not be so powerful as to diminish the visibility of the side-lights."



## LAUNCHES AND TRIAL TRIPS.

## LAUNCHES—ENGLISH.

**Passenger and Cargo Steamer.**—There has recently been launched from the shipbuilding yard of Messrs. Joseph L. Thompson & Sons, Limited, North Sands, Sunderland, a finely modelled passenger and cargo steamer, built to the order of the Mersey Steamship Co., Limited, which is under the management of Messrs. Leech, Harrison & Forwood, Liverpool. The vessel is intended for their passenger trade between London, Madeira, and the Canary Islands. She is 242 ft. long, between perpendiculars; 34 ft. breadth, extreme, and 19 ft. 6 in. depth, moulded. She will have a deadweight carrying capacity of about 1,600 tons, and will be sumptuously fitted up and furnished for 30 first-class passengers, with all the latest sanitary and other arrangements. The engines are 19½ in., 32½ in., and 54 in. diameter respectively, with a stroke of 39 in., working at 180 lbs. pressure, with Howden's system of forced draught. During construction the vessel was under the personal superintendence of Messrs. William Esplen & Son, Liverpool.

**Steel Barge.**—On October 23rd Messrs. R. Williamson & Son, Workington, launched a steel barge for Brazilian owners. It is 130 ft. long, 32 ft. beam, and 9 ft. depth, moulded, and will carry 500 tons.

**Redcap.**—On October 31st the steamer *Redcap* was launched by Earle's Shipbuilding Co., at Hull. She is a steel trawler, built for the Pioneer Steam Fishing Co., of Grimsby (managers, Messrs. Moodys & Kelly), and is 93 ft. 6 in. long; 20 ft. 6 in. beam, by 10 ft. 6 in. depth of hold. She will be fitted with triple-compound three-crank engines, of 45 N.H.P., and her boiler is made for 170 lbs. steam pressure.

**Cleve.**—On Thursday, October 31st, there was launched from the yard of the Sunderland Shipbuilding Co., Limited, to the order of Monsieur M. Matthys, of Antwerp, a steel screw steamer, 176 ft. between perpendiculars, by 29 ft. breadth, by 15 ft. 2 in. depth, classed 100 A1 at Lloyd's, under special survey, having raised quarterdeck, bridge, and topgallant forecabin. The officers' and engineers' mess-room and accommodation is placed amidships, whilst the captain is berthed in house on deck. The vessel is provided with steam winches by Mr. R. Welford, of Pallion, and has large hatches to suit the trade for which the boat is intended. Steering gears by Messrs. Hastie & Co., patent windlass by Messrs. Emerson, Walker & Thompson Bros., Limited. Triple-compound engines by Messrs. Westgarth, English & Co., of Middlesbro'-on-Tees, having cylinders 15½ in., 25 in., and 41 in., by 27 in. stroke, 160 lbs. working pressure, which include all the latest improvements in marine engineering. The vessel is built upon very fine lines for a steamer of this type, and will carry on 14 ft. draught of water 850 tons deadweight, in the exceedingly low net register tonnage of 280. Her speed, loaded, will be 10 knots average. Several vessels of this class have been built by this company, all carrying a very large cargo upon a similarly small net tonnage. During construction, both hull and machinery have been inspected by Mr. Summers on behalf of the owner, and upon leaving the ways she was gracefully named *Cleve* by Mrs. Summers, of Middlesbro'.

**Haddon Hall.**—On October 31st there was launched from the Jarrow yard of Messrs. Palmer's Shipbuilding and Iron Co., Limited, a large screw steamer of the following dimensions, viz.:—380 ft. by 45 ft. by 30 ft. 9 in. moulded. The vessel is constructed of steel to obtain Lloyd's highest class, and will be rigged as a two-masted schooner. She is of the three-deck type with a poop, bridge and forecabin. The poop is fitted for the accommodation of the crew. The bridge covers the machinery openings amidships, the accommodation for the captain and officers being in steel deckhouses on top of bridge-deck. The forecabin is fitted for store-rooms, &c. Arrangements are made for carrying water ballast in a partial double bottom at aft and a deep tank amidships. The vessel is fitted with two steel decks extending all fore and aft, and she is divided into seven watertight compartments by means of six steel bulkheads. She will also be fitted with a complete system of shifting boards, grain hatches, and all the latest requirements for carrying grain cargoes in bulk. A powerful steam windlass is fitted for working the cables, and a steam steering gear amidships, and all necessary steam winches, derrick, &c., for the rapid loading and discharging of cargoes will be supplied, and the vessel will

be fitted with all the most modern improvements for a vessel of her class, and is designed to load about 6,300 tons deadweight on about 24 ft. 6 in. draught. As the vessel left the ways she was christened the *Haddon Hall*, by Miss Dalrymple. The company then adjourned to the model-room where Mr. J. D. Milburn proposed success to the ship, coupled with the name of Miss Dalrymple. Mr. Milburn referred to the long associations which had existed between Messrs. Robert Alexander & Co. and Palmer's Co., and to the number of ships which had been built for Messrs. Alexander at Jarrow. Mr. Dalrymple, representing the owners responded, and expressed the hope that the relations between his friends Messrs. Palmer would long continue. He also said he trusted that in addition to merchant work he would soon see the Jarrow yard full of work for H.M. Government. Among those present were Admiral Cleveland, Mr. C. P. Markham, and Mr. A. M. Palmer, directors of the Palmer's Co. The *Haddon Hall* has been built to the order of Messrs. R. Alexander & Co., of Liverpool, and has been built under the personal supervision of Mr. Dalrymple, superintending engineer, of Liverpool, and Mr. Maxwell Hill, of Newcastle. The sister ship *Hardwick Hall* will be launched shortly.

**Holmfild.**—On Thursday afternoon, October 31st, Messrs. Richardson, Duck & Co. launched from their yard a steel screw steamer of the following dimensions, viz.:—Length, over all, 300 ft.; beam, extreme, 42 ft.; depth, moulded, 20 ft.; tonnage, gross, about 2,330 tons. This vessel, which has been built to the order of the Field Steamship Co., Limited, Stockton-on-Tees, will take Lloyd's 100 A1 class, and has been built under special survey. She is of the part awning deck type, with break poop for captain and officers, engineers being berthed in between decks abaft engine-room, and crew forward. Equipment includes four steam winches, large donkey boiler, stockless anchors, steam steering gear, &c. Engines will be fitted by Messrs. Blair & Co., having cylinders 22 in., 36 in., and 59 in., by 39 in. stroke, steam being supplied by two single-ended boilers, having a working pressure of 160 lbs. As the vessel was leaving the ways she was christened *Holmfild* by Mrs. Place, wife of Lieut.-Col. Place, J.P., Ashleigh, Darwen, Lancs., and sister of Mr. A. G. Rudd, the chairman of the company.

**Mobile.**—On November 4th Messrs. Furness, Withy & Co., Limited, launched from their shipbuilding yard at Hartlepool a large steel screw steamer, built to the order of Messrs. G. Horsley & Son, West Hartlepool. The vessel is a substantial type of a modern cargo boat, measuring over 850 ft. in length, and built throughout of Siemens-Martin steel, with a deadweight of about 5,400 tons on her summer freeboard, and also large cubical capacity by which she will be specially suitable for the conveyance of cotton, jute, timber and other measurement cargoes, and is built to the highest class at Bureau Veritas. Every care has been taken in designing this vessel to ensure the construction being made as strong as possible for the heavy deadweight trade, and the internal arrangements are specially adapted for carrying large timber and other bulky cargoes. The vessel is built on the deep frame system with cellular double bottom all fore and aft, subdivided at intervals; the after peak being also available as a tank. The main and fore holds are divided by steel watertight bulkheads efficiently stiffened by an iron longitudinal division. The greater portion of the shell plating is in 24 ft. lengths, and is efficiently backed up by heavy frames and reverse bars all fore and aft, the top-sides being extra thick to withstand the heavy Atlantic trade. The bottom plating is also thicker than usual in the way of the ballast tanks. The whole of the weather decks, tank top, floor plates, &c., are also of extra thickness, and the hatchways are of extra size to take in the bulkiest cargo. Large winches to hatches, patent steam steering gear amidships with hand gear aft, steam windlass, large donkey boiler and patent stockless anchors are fitted. The vessel will be rigged as a pole-masted schooner, and to make her available for bridge and canal work the topmasts are telescopic. The engines and boilers have been constructed by Messrs. T. Richardson & Sons, Limited, Hartlepool, and are of massive design with every provision for economical working. The ship and engines have been constructed under the supervision of Mr. T. G. Barrow on behalf of the owners. On leaving the ways the vessel was gracefully christened *Mobile* by Mrs. M. H. Horsley.

**Wolviston.**—On November 4th Messrs. Ropner & Son, of Stockton, launched a steel screw steamer of the following dimensions:—Length, between perpendiculars, 300 ft.; breadth, 43 ft.; and moulded depth, 19 ft. 8 in.; which they have built

for Messrs. Webster & Barraclough, of West Hartlepool. The steamer is built off the part awning decked rule, with poop and raised quarterdeck; her deadweight carrying capacity being 3,700 tons on 18½ ft. The engines will work up to about 1,000 effective H.P., and are by Messrs. Blair & Co., Limited, having cylinders, 22½ in., 36½ in., and 60 in., by 39 in. stroke, steam being supplied by two steel boilers, working at 160 lbs. pressure. The name of the steamer is *Wolviston*.

**Champion.**—On November 4th a steel ketch-rigged steamer, of about 240 tons gross, named the *Champion*, was launched at South Shields; owned by Messrs. J. and A. Brown, Newcastle (N.S.W.).

**Hovding.**—On November 5th there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, West Dock, South Shields, a steel screw steamer, built to the order of Messrs. Brungaard, Kjøsterud & Co., of Dram. The vessel is of the well-decked type, and has poop over raised quarterdeck, long bridge and topgallant forecastle, and is of the following dimensions:—Length, 280 ft.; breadth, 39 ft.; and depth, 20 ft. 8½ in. She is fitted with all the latest improvements for general cargo trade, and takes the highest class at Lloyd's under special survey, and also of the Norwegian Veritas. Her deadweight capacity is 3,100 tons. Her engines, also built by Messrs. John Readhead & Sons, are of the triple-expansion type, having cylinders 21 in., 35 in., and 57 in., and 39 in. stroke, steam being supplied by two large steel boilers working at a pressure of 160 lbs. per square inch. The vessel has been built under the superintendence of Mr. C. A. Bushell, Newcastle, and Captain Salvesen. She was named the *Hovding* by Mrs. Salvesen, wife of Captain Salvesen.

**Clydesdale.**—On November 5th a steel schooner-rigged steamer, of about 3,580 tons gross, named the *Clydesdale*, was launched at Sunderland; owned by Mr. A. Laing, Sunderland.

**Eolus.**—On November 6th Mr. Sidney J. Dewdney launched at Brixham a new schooner yacht called the *Eolus*. She has been built to the design of her owner, Mr. J. C. Scholey, of London, and is 85 ft. over all; 15 ft. 6 in. main breadth; 11 ft. depth of hold, and 65 tons register.

**Shirley.**—On November 16th Messrs. Joseph L. Thompson & Sons, Limited, launched from their North Sands shipbuilding yard, Sunderland, the steel screw steamer *Shirley*, built to the order of Messrs. Houlder, Middleton & Co., London. The vessel is of the following dimensions, viz:—Length, 324 ft.; breadth, 41 ft.; depth, moulded, 23 ft. 1½ in., and is of the partial awning deck type, built under special survey for Lloyd's highest classification. The engines are by Messrs. Blair & Co., Stockton-on-Tees, having cylinders, 23 in., 37½ in. and 61½ in. diameter respectively, with a stroke of 39 in., 160 lbs. working pressure.

**Sui Sang.**—On Saturday, November 16th, Sir Raylton Dixon & Co. launched from the Cleveland Dockyard, Middlesbrough, a fine steel spar-deck screw steamer, which has been built to the order of the Indo-China Steam Navigation Co., Limited, London. Her principal dimensions are:—Length, 323 ft.; beam, extreme, 41 ft.; depth, moulded, 27 ft. 6 in., with a deadweight carrying capacity of about 4,500 tons on 22 ft. The vessel has been built on the deep frame system, under Lloyd's special survey for their highest class and specially designed for trading in the Eastern seas. The spar-deck is of steel, sheathed with teak, main deck of steel, and the poop, bridge, and forecastle decks are of teak. Large cargo ports are also fitted in 'tween decks, opposite each hatch, a large saloon with accommodation for 100 passengers, is handsomely fitted up under bridge-deck. The captain is accommodated in a large teak house on bridge, and the officers, engineers, &c., under bridge deck. Rooms for compradors are fitted up in poop aft. Triple-expansion engines, 23 in., 36 in. and 59 in. by 42 in. stroke will be supplied by Messrs. The North Eastern Marine Engineering Co. Limited, Sunderland, with two large steel boilers fitted with Howden's forced draught. The hull and machinery have been built under the supervision of Mr. Buchanan and Mr. Duncan. On leaving the ways she was gracefully named *Sui Sang* by Miss Lena Watson, of Whitehaven.

**Eastlands.**—On November 18th Messrs. Ropner & Son, of Stockton-on-Tees, launched a steel screw steamer of the following dimensions:—Length, between perpendiculars, 290 ft.; breadth, 43 ft.; moulded depth, 19 ft. 9 in., which they have built for Messrs. Jos. F. Wilson & Co., West Hartlepool. The steamer is built off the part awning decked rule, with poop and

raised quarter deck, her deadweight carrying capacity being 3,500 tons on 18½ ft. The saloon and cabins for captain and officers are fitted in the poop, the engineers' accommodation being amidships. She is built on the web-frame principle, leaving the holds entirely clear for cargo, and carries her water ballast in a cellular bottom and in the after peak; all labour-saving appliances are fitted for the economical working of the steamer, and also for the expeditious loading and unloading of cargoes; she has steam steering gear amidship and screw gear aft, four powerful steam winches, two large donkey boilers, direct steam windlass, stockless anchors, &c. The engines will work up to about 900 effective H.P., and are by Messrs. Blair & Co., Limited, having cylinders 21½ in., 35½ in. and 53½ in., by 39 in. stroke, steam being supplied by two large steel boilers, working at 160 lbs. pressure. As the steamer moved away the name of *Eastlands* was given to her by Miss Elsie Pycroft, of Peterborough.

**Elm Branch.**—On the afternoon of November 18th, in the presence of a large assemblage of spectators, which included a number of shareholders in the Nautilus Steam Shipping Co., a turret steamer, built to the order of that company, was launched from the yard of Messrs. Doxford & Sons, Pallion. She left the ways shortly after half-past two, and as she commenced to glide slowly waterwards she was christened the *Elm Branch* by Mrs. W. Ritson, wife of Mr. W. Ritson, the managing owner of the company. The launch was a most successful one. The vessel is a duplicate of the *Oak Branch*, which was launched from the same yard, for the same firm, on the 19th of August last. She will carry 5,400 tons deadweight of cargo, with a 21 ft. draught of water. Her net registered tonnage is 2,006. The great feature of the vessel is her large measurement capacity. She is to be engined with tri-compound engines of 1,300 H.P. She will have high-pressure boilers fitted with Serre tubes, and Brown's patent system of induced draught. The *Elm Branch* is the seventeenth vessel of her type that has been launched, and the eighth plated on the Bell and Rockliff system. She is the tenth vessel launched from Messrs. Doxford & Sons' yard this year, nine of them being turret steamers, and the tenth a torpedo destroyer for the Government. The total tonnage of turret ships now afloat is brought up to 68,000 tons, and with the vessels in hand it will be brought to 100,000. After the launch the company adjourned to the offices, and here light refreshments were provided. Mr. W. T. Doxford, M.P., in proposing "Success to the *Elm Branch*," remarked that she was a vessel of light draught, and the seventeenth turret ship now in the water. Figures now to hand went to show that vessels of her type for certain trades were making their way in the world, and had now been practically all over the world. They had proved themselves eminently satisfactory as sea vessels in every trade in which they had been tried. The new plating system also had been found to be a successful improvement, and the only thing that astonished him was that some of their brother shipbuilders rather lagged behind with regard to its adoption. He, however, held that the day would come when all vessels would be built with the special type of plate he referred to, because the system increased the vessel's strength, tightened her, and enabled her to do her work better. Referring to trade generally, Mr. Doxford said that for the last few months there had been undoubted signs of general improvement. Unfortunately war clouds in the far East had tended to shake that improvement for the moment, but he thought they might hope that the present Government would be able, by their firm and judicious policy, to prevent any war breaking out. If they succeeded he felt sure they would have a steady improvement in the general trade of the world, and therefore shipping, and ultimately the poor shipbuilder, who had to wait the longest, would benefit in the improvement.

**Penarth.**—On Monday, November 18th, Messrs. William Gray & Co., Limited, launched a fine large steel screw steamer which they have built to the order of Messrs. Morel Brothers, of Cardiff. She will take Lloyd's highest class, and is of the following dimensions, viz:—Length over all, 336 ft., breadth, 47 ft., depth, 24 ft. 10 in., with a half poop bridge over the machinery space, and a topgallant forecastle. A tasteful saloon and state-rooms, together with the captain's and officers' rooms, will be fitted under the poop. The hull is built with web frames and double bottom under each hold for water ballast. Six steam winches, steam steering gear amidships, and screw gear aft, patent direct steam windlass, iron longitudinal grain division, stockless anchors, and a complete

outfit will be fitted for a first-class cargo boat. Fine triple-expansion engines are being supplied by the Central Marine Engine Works of Messrs. William Gray & Co., Limited. They will develop over 1,200 H.P. The cylinders are 24 in., 38 in., and 64 in. diameter, with a piston stroke of 42 in. Steam will be supplied by three large main boilers of steel, at a working pressure of 160 lbs. per square inch. This arrangement enables donkey boilers to be dispensed with, as any one of the main boilers can be kept under steam for working the winches, windlass, &c. The vessel has been constructed under the superintendence of Mr. W. G. Morel and Mr. F. Good, on behalf of the owners, and the ceremony of christening her *Penarth*, was gracefully performed by Mrs. W. C. Gray, of West Hartlepool.

**Andania.**—On November 18th the launch of a general cargo-carrying steamer took place from the shipbuilding yard of Messrs. Pickersgill & Son, Southwick. On leaving the ways the vessel, which has been built to the order of Messrs. T. S. & W. Roberts, of Liverpool, was named the *Andania*.

**Bertholey.**—On November 19th a handsomely modelled screw steamer was launched from the yard of Messrs. William Gray & Co., Limited, of the following dimensions viz.:—Length, over all, 310 ft.; beam, 43 ft.; and depth, moulded, 22 ft. 1½ in.; built to the order of Mr. William Gibbs Morel, of Cardiff. She will take Lloyd's highest class, has full poop bridge, and top-gallant forecastle, iron fore and aft centre bulkhead, four large hatchways with powerful winch to each, and direct-acting steam windlass, self-housing anchors, steam steering gear and all other modern appliances; neatly fitted and furnished saloon, captain and officers' rooms aft, engineers' rooms of large dimensions, under the bridge, crew having large, well-ventilated, quarters in the forecastle. She will be fitted by the Central Marine Engine Works, of Messrs. Wm. Gray & Co., Limited, with triple-expansion engines of 1,000 H.P., working on three cranks. Cylinders, 22 in., 35 in., and 59 in., the stroke of piston, 39 in. Three large boilers built of steel to give an ample supply of steam, working at a pressure of 160 lbs. per square inch. The vessel and machinery have been built under the personal superintendence of Mr. W. G. Morel and Mr. F. Good. The ceremony of christening the ship *Bertholey* as she left the ways, was gracefully performed by Miss Ethel Oddy, Hallcroft Hall, Oddingham, near Leeds.

**Sir Robert Hay.**—On November 19th, at the Great Western Docks, Plymouth, Messrs. Willoughby Bros. launched a steel paddle steamer *Sir Robert Hay*, which they have constructed for the use of the War Department at Portsmouth. She is 108 ft. in length, 20 ft. in breadth, and 10 ft. in depth. The breadth over the paddle-boxes is 35 ft. The engines are of the compound surface-condensing oscillating type, with cylinders of 19 in. and 36 in. in diameter, with a stroke of 32 in. in diameter.

#### LAUNCHES.—SCOTCH.

**Cloch.**—On October 25th Messrs. Russell & Co., Port-Glasgow, launched a three-masted barque of 1,400 tons register, to carry 2,400 tons cargo, to the order of Messrs. William Walker & Co., Greenock. The dimensions are:—Length, 236 ft.; breadth, 36 ft.; depth, 21 ft. The vessel was gracefully named *Cloch* by Miss Dryburgh, Fife.

**Sphene.**—On November 2nd Messrs. Scott & Sons launched at Bowling, on the Clyde, a screw steamer of dimensions: 142 ft. 6 in. by 25 ft. by 12 ft., built to the order of Mr. William Robertson, 15, Gordon Street, Glasgow. Compound surface-condensing engines will be fitted on board by Messrs. Muir & Houston, Kinning Park, Glasgow. The steamer was named *Sphene*.

**Leven.**—On November 4th Messrs. Scott & Co., Bowling, launched from their shipbuilding yard the steel screw steamer *Leven*, which has been built to the order of the Dumbarton Steamboat Co., Limited, and is intended for their carrying trade between Glasgow and Dumbarton. This company was formed about a year ago to take over the business of carriers and traders of M'Farlane, Lang & Co. Hitherto they have had possession of the steamer *Lochfyne*, but it has been felt that this vessel is not only worn out, but from the point of speed, &c., is scarcely suitable for the company. They therefore gave the Messrs. Scott a commission to build a new vessel. The christening ceremony was gracefully performed by Miss Buchanan, of Clerkhill, Dumbarton, daughter of Mr. Walter Buchanan,

secretary of the company. The steamer *Leven* has been designed not only to meet the present requirements of the company's trade but with a view to the future development of the business. The machinery has been fitted with an ample margin of power, and, along with the hull, constructed in excess of the requirements of Lloyd's and the Board of Trade, and with all the necessary equipment for general coasting trade. The hull is constructed of steel, having dimensions:—Length, 85 ft.; breadth, 21 ft.; depth 8 ft., with the deck, houses, rails, other fittings, where practicable, of iron. The machinery is placed under a raised quarter deck, with iron house on top, which house extends aft to rail, and is fitted up for the carriage of light goods and parcels. The hold has a hatch aft for general cargo, worked by powerful steam crane, which has a height of jib capable of lifting goods upon the deck of the largest description of vessel. The forward part of the hold is arranged with hatch, and suitable strengthening of construction, so as to take on board the largest size of boilers made in the district and taken to Glasgow for shipment. A large and well-ventilated forecastle is suitably fitted for the accommodation of the crew. The engines have been constructed by Messrs. Ross & Duncan, and are compound surface-condensing with cylinders 12 in. and 26 in. in diameter, with a stroke of 16 in. The steam is supplied from a horizontal boiler at a working pressure of 120 lbs. per square inch. After the launch the company were entertained in the firm's offices, and the health of the *Leven* heartily pledged.

**Okara.**—On November 4th Messrs. William Denny & Brothers launched from the Leven shipyard, Dumbarton, a steel screw steamer of 5,290 tons gross, for the British India Steam Navigation Co. The dimensions of the vessel are 410 ft. by 50·7 ft. by 28·95 feet, and she has been constructed on the same lines as her sister ship, the *Okla*, built by Messrs. Denny for the same company some months ago. The new vessel was gracefully christened the *Okara* by Miss Ruth Denny, daughter of Colonel Denny, M.P., Garmoyle.

**Kirkhill.**—On November 7th Messrs. Russell & Co. launched at Port-Glasgow a steel screw steamer, built to the order of Messrs. James R. Cuthbertson & Co., Glasgow. The vessel was named *Kirkhill*, and is of the following dimensions:—Length, 350 ft.; breadth, 43 ft. 2 in.; and depth, 29 ft. 8 in. moulded, with a deadweight carrying capacity of about 5,650 tons. Messrs. Dunmuir & Jackson, Govan, will supply the engines, which will be on the triple-expansion principle, with cylinders 25 in., 40 in., and 60 in. by 45 in. stroke.

**Screw Steam Yacht.**—On November 7th there was launched by the Ailsa Shipbuilding Co., at Troon, a handsomely-modelled screw steam yacht of the following dimensions:—Length on load water line, 87 ft.; breadth, moulded, 15 ft. 9 in.; depth, moulded, 10 ft. She has been designed by Mr. G. L. Watson, and is owned by Mr. Robert Stewart, of Kinloch-Moidart.

**Evening Star.**—On November 14th the new steam liner, the *Evening Star*, which has been built to the order of Mr. Thomas Walker, of Aberdeen, on behalf of a Footdee crew, was launched from the shipbuilding yard of Messrs. A. Hall & Co., at Aberdeen.

**King Sing.**—On November 16th Messrs. Hall, Russell & Co., launched from their yard at Aberdeen, the steel screw steamer *King Sing*, built for the Indo-China Steam Navigation Co., Limited, London. The vessel is intended for the Tientsin trade, and is of the following dimensions:—Length over all, 270 ft.; breadth, 38 ft. 6 in.; depth, 23 ft. 9 in., and 2,000 tons gross. The vessel is of the spar deck type, and built to class 100 A1 at Lloyd's, and having all requirements to pass Board of Trade for passenger certificate. On the spar deck there are two large steel houses for the accommodation of first-class Chinese passengers, while in the 'tween decks a large number of third-class passengers can be accommodated. On shade deck there is a teak house containing saloon, state-rooms, bath-room and pantry for first-class European passengers; captain's room and chart room. The saloon is enamelled white and gold, with mahogany furniture upholstered in morocco. Officers, engineers and stewards' berths, mess-room, bathrooms, lavatories, galleys and sculleries are fitted up in bridge house, and the crew are accommodated in forecastle. Water ballast tanks are fitted in after and fore peaks, and in deep hold tank amidships. Special arrangements are made for discharging cargoes, suitable hinged stages being fitted in holds in way of each hatch, and cargo ports, as

the cargoes will be principally discharged by manual labour. Napier's steam windlass, and Caldwell & Co.'s steam steering gear are fitted; and a very complete outfit of navigation instruments are to be supplied, including Lord Kelvin's latest design of compass. The engines are triple-expansion of the most modern type, constructed by the builders, having cylinders, 22½ in., 37 in. and 60 in. diameter with a stroke of 39 in., capable of developing over 2,000 I.H.P., two large steel boilers, with a working pressure of 170 lbs. steam, fitted with Howden's system of forced draught. A complete installation of electric light is being fitted up by Messrs. Holmes, of Newcastle. The construction of the vessel and engines have been looked after by Mr. Buchanan, marine superintendent of the company. As the vessel left the ways she was gracefully named *King Sing* (which in English is *Lucky Star*) by Miss Cheyne, London.

**Nanshan.**—On November 16th the Grangemouth Dockyard Co. launched from their shipbuilding yard at Grangemouth a handsomely-modelled steel screw steamer. The dimensions are 285 ft. by 39 ft. by 24 ft. moulded. She is built to the three-deck rule, and classed 100 A1 at Lloyd's under their special survey. She is to the order of Messrs. Richardson, of London, and is specially fitted up for their China trade, having side ports, &c., and accommodation for coolies. The vessel has been supplied with all the latest appliances for working ship and cargo, and is to carry 3,400 tons deadweight. The machinery will be supplied by Messrs. Hutson & Son, of Glasgow. On leaving the ways she was named the *Nanshan* by Miss Richardson, London, daughter of one of the owners.

**Woodburn.**—On November 18th Messrs. Russell & Co. launched at Port-Glasgow a three-masted barque of 1,500 tons net register, capable of carrying 2,600 tons cargo. Dimensions:—Length, 240 ft.; breadth, 37 ft. 6 in.; depth, 21 ft. 9 in. The vessel is named *Woodburn*, and is to the order of Messrs. R. Shankland & Co., Greenock.

**Gibel Musa.**—On November 18th Messrs. Robert Duncan & Co., Limited, Port-Glasgow, launched a steel paddle-steamer, named *Gibel Musa*, for cattle and passenger traffic, and also for towing purposes, at Gibraltar. This steamer is classed 100 A1 at Lloyd's, and is to the order of M. H. Bland & Co., Gibraltar. The dimensions are:—Length, 150 ft.; breadth, 25 ft.; depth, 12 ft. 8 in. Compound surface-condensing engines will be supplied by Messrs. Rankine & Blackmore, Greenock. The vessel was named by Miss Polly Boyd, daughter of Mr. J. W. Boyd, consulting engineer, Glasgow, who superintended the construction.

**Ætna.**—On November 19th Messrs. Fleming & Ferguson, Limited, launched at Paisley the steel screw tug-steamer *Ætna*. The vessel has been built to the order of the Admiralty, and her machinery will be supplied and fitted by the builders. She forms part of an order for plant required in connection with harbour works at Gibraltar.

**Liverpool.**—On November 22nd Messrs. David J. Dunlop & Co. launched from Inch Works, Port-Glasgow, a small steel screw steamer named *Liverpool*, being the third of six steamers under construction by them for towing purposes to the order of foreign owners.

### TRIAL TRIPS.

**Cayo Blanco.**—The new screw steamer *Cayo Blanco*, built by Messrs. John Readhead & Sons, West Docks, South Shields, to the order of Messrs. Ernest Bigland & Co., London, was lately taken to sea on her official trip. The vessel, which is 315 ft. long, 41 ft. broad, and 26 ft. 10 in. deep, is of the spar-deck type, with long poop, long bridge, and topgallant forecastle. She has been built under special survey, is classed 100 A1 at Lloyd's, and is fitted with all the latest improvements and appliances for the working of the vessel, and for rapid loading and discharging of cargo. Her engines, which have also been constructed by Messrs. John Readhead & Sons, are on the triple-expansion principle, having cylinders 24 in., 40 in., and 65 in., by 42 in. stroke, steam being supplied by two large steel boilers working at a pressure of 160 lbs. per square inch. After several runs along the coast the vessel attained a mean speed of 12 knots over the measured line, the machinery working very smoothly, and the trial being highly satisfactory to both builders and owners.

**Madge Ballantyne.**—The steamer *Madge Ballantyne*, built for

Messrs. R. B. Ballantyne & Co., of Glasgow, by Messrs. Mackie & Thomson, of Govan, proceeded down the river lately for a test of her machinery. She has been built to Lloyd's A1 special survey requirements, and measures:—Length, 162 ft.; breadth, 25 ft. 6 in.; and depth, moulded, 12 ft. 6 in., and is intended for Messrs. Ballantyne's coasting and general trade. A special feature of the vessel is the extra large hatches, which will allow her to trim coal cargoes automatically, by that means effecting a saving in coal-trimmers charges. The steam winches are supplied by Clarke, Chapman, & Co., Limited; direct-acting steam steering gear of the "Sentinel" type is fitted by Alley & McLeellan, and her appliances for the rapid handling of cargo are of the most modern description. Triple-expansion engines are supplied by Muir & Houston, the cylinders being 15 in., 25 in., and 40 in. diameter, by 27 in. stroke, steam being provided by an extra large boiler working at 170 lbs. pressure, and fitted with Morison's patent furnaces. The engines indicated upwards of 500 H.P., and propelled the vessel at a speed of 11½ knots on the measured mile. In addition to the owners, builders, and engineer's representative there were present Mr. and Mrs. Raeside, Mrs. Houston, Mr. and Mrs. Ballantyne, senr., Mr. and Mrs. John Buchanan, Mr. and Mrs. A. Laidlaw, Mr. Robin and others.

**Korniloff.**—As another indication of the way in which our Russian friends avail themselves of the facilities which Tyne-side enterprise has provided for building, altering and equipping modern steamers, may be mentioned the fact that the Wallsend Slipway and Engineering Co., Limited, have been executing important work this year on behalf of the Russian Steam Navigation and Trading Co., of Odessa, consisting of supplying new engines and boilers and completely renovating three of their steamers. The first of the three steamers, the *Czar*, was completed a few months ago, and the second steamer, viz., the *Korniloff*, which has been at the Slipway Co.'s works for the last month or two, went for her trial trip. The weather was most unfavourable, with a stiff gale blowing from the N.E., accompanied by sleet and rain, but the trial proved of a most satisfactory description. The vessel was kept at full speed for a continuous run of six hours' duration, and during the whole of the time the machinery worked perfectly and to the entire satisfaction of Mr. Nevins, the company's superintendent. A speed of 12 knots per hour was easily obtained under the most adverse conditions, being half a knot in excess of that guaranteed under the contract. The *Korniloff* was built and engined on the Tyne in 1869, and the policy of her owners being to keep their fleet thoroughly up to the mark, she has had her engines and boilers taken out and new boilers with triple-expansion engines supplied in their stead. The particulars of the machinery are as follows:—Cylinders, 28 in., 37 in. and 61 in. by 39 in. stroke, with two single-ended boilers, working at 160 lbs. pressure, with all modern auxiliaries, such as centrifugal circulating pumps, feed-heater, evaporator, filter, &c. In addition to the extensive work in the engine-room department, the whole of the vessel has been almost completely gutted; the entire deck has been renewed, and in some parts new and additional accommodation fitted. The existing first and second class passenger accommodation has been completely renovated, and additional cabins supplied for the accommodation of lady passengers. The vessel has been fitted up throughout with a new installation of electric lighting by Messrs. J. H. Holmes & Co., of Newcastle-on-Tyne. New powerful steam windlasses and steam-steering gear of most modern type have been provided, and when the vessel steamed out of the Tyne river the day after her trial trip, under the command of Captain Emeretly, bound for Odessa, she was considered to be equal to the most modern vessels afloat. The work to these vessels has been and is being carried out under the personal superintendence of Mr. W. Nevins and the captain in charge of each vessel. These gentlemen were present at the trial runs, and, assisted by a numerous staff, they made it their duty to carry out a most detailed and careful record of the performance of the main engines and the numerous auxiliaries which the engine-room contains. The Slipway Co. were represented by Mr. Boyd, the managing director, Mr. Wallis and Mr. Bell, engineering and shipyard managers, and a staff of assistants. The third vessel, the *Lazareff* (s.), is now alongside the company's wharf undergoing a similar transformation.

**Oakwold.**—The steam trawler *Oakwold*, designed for inshore fishing, measuring 92 ft. in length; 20 ft. 6 in. in breadth, by 11 ft. depth of hold, and built to the order of the Northwold Steam Fishing Co., of Grimsby, by Messrs. Cochrane & Cooper

of Beverley, has been on her trial trip. The machinery, by Messrs. Amos & Smith, of Hull, consists of triple-expansion engines of 35 N.H.P., having cylinders of 10 in., 16 in., and 25½ in. diameter, by a stroke of 20 in. The steam is supplied by a large cylindrical multitubular boiler of steel. The *Oakfold* proceeded to Grimsby, where she took on board Mr. T. Sowerby (secretary), Mr. R. Long (director), Mr. Broughton (superintending engineer), and Mr. Hutton (marine surveyor of the owning company). A capital run was made out to sea and home again, a speed of ten knots being obtained. On again reaching Grimsby, the ship was taken over by the Northwold Co.'s representatives, and is now on her way to the fisheries. Mr. Cochrane represented the builders, and Mr. Brackenbury the engineers.

**Prins Hendrik.**—The official trials of the paddle steamer *Prins Hendrik*, built by the Fairfield Shipbuilding and Engineering Co., Limited, Govan, for the Zealand Steamship Co., of Flushing, took place lately. Which showed the vessel—the first of three sister ships—to be possessed of great speed and exceptional ability. On the whole journey of 110 nautical miles an average speed of over 20 knots was maintained.

**Firby.**—The s.s. *Firby* is a fine steel screw steamer, built by Messrs. Wm. Gray & Co., Limited, to the order of Messrs. John Coverdale & Son, of West Hartlepool. She has been built to Lloyd's highest class, and of the following dimensions:—Length, over all, 300 ft.; breadth, 42 ft.; depth, 19 ft. 9 in. The deck erections consist of poop, raised quarterdeck, and partial awning deck. A handsome saloon, state-room, and accommodation for captain and officers have been fitted up in the poop, and comfortable quarters for the engineers amidships, and for the crew forward. The hull is built with web frames and cellular double bottom, and there is also a large ballast tank in the after peak. Four steam winches, two donkey boilers, steam steering gear amidships, hand screw steering gear aft, patent windlass, schooner rig, boats on beams overhead, shifting boards throughout, and all modern appliances have been fitted. The engines are of the triple-expansion type, and have been supplied by the Central Marine Engine Works of Wm. Gray & Co. The cylinders are 22 in., 35 in., and 59 in. in diameter, with a stroke of 39 in. The boilers are built of steel and are of large size, giving an ample supply of steam. The trial took place on November 18th, and after manoeuvring the vessel in Hartlepool Bay for the purpose of adjusting compasses, the vessel proceeded to Sunderland to load. The engines ran in a highly satisfactory manner in every respect, the Mudd & Airey patent metallic packing, with which all the rod and spindle glands have been packed, being entirely steam-tight and running without any heating. There were present Mr. Jas. Airey (under whose superintendence the vessel and her machinery have been constructed), on behalf of the owners, Captain Murrell, representing the builders of the ship, Mr. Lindsay, the engine builders; Mr. T. C. Nevison and Mr. G. T. Younghusband, superintendent engineers, were also on board.

**Northumberland.**—The handsome iron paddle steam ferry-boat, recently launched from the shipbuilding yard of Messrs. Wood, Skinner & Co., at Bill Quay, Newcastle, and built by that firm to the order of the River Tyne Improvement Commission, has had a very successful trial trip on the river. The vessel is intended for the passenger, vehicle and animal traffic between North and South Shields, and is the largest of this type possessed by the Commissioners. Its principal dimensions are as follows, viz.:—Length, between perpendiculars, 110 ft.; extreme breadth, 43 ft.; depth, moulded, 9 ft. 6 in. The engine-house and deck cabins are forward of the vehicle deck, and the latter is approached by a passage on either side in way of paddle cases. The top of the deck cabin forms a hurricane deck, which is reached by broad staircases, which have been substituted in place of the customary narrow steps set on the paddle casing. Upon this deck, which is protected by a neat iron handrail and stanchions, patent seats are provided for passenger accommodation. These seats consist of floating rafts in a closed up form, but on being put into the water they immediately expand and become an unsinkable raft. Other life-saving appliances are, of course, also provided in accordance with the Board of Trade requirements. On this deck there is likewise an iron wheelhouse of exceptional height, with plate-glass windows all round, affording excellent look-out facilities. Inside this house is fitted a powerful steam steering apparatus of the combined steam and

hand type. A brass ball binnacle head, fitted with a spirit compass, is in full view of the man at the wheel, who has also direct communication with the steam whistle by means of a cord conveniently placed, and also with the engine-room by a speaking tube. The passenger cabin on deck below is of a large area, and is amply lighted by large plate glass windows all round, and fitted with neat and comfortable seats. The registered passenger accommodation of the vessel, it may be mentioned, is for 818 persons. The fore-part of the vessel below deck is fitted up as a smoking cabin, lighted by large lights through the side, and by windows from above. Ample sitting accommodation is provided here, and the entrance to this cabin is by a straight and easy staircase in lieu of the old-fashioned companion. The after end of the boat below deck is fitted up for the crew, with cooking and messroom accommodation, and with lockers for stores. The gateways to the vehicle deck are of extra large size and strength, and are raised and lowered by independent donkey engines. A special feature is a passenger gateway at the side of each vehicle gangway; these are adapted to the new landing stages, and passengers will embark and disembark by a passage-way independent of the cart-way. There were several commissioners and their officials present at the trial, all of whom expressed themselves as being highly satisfied with the vessel in all its details, nothing apparently having been omitted by the builders to ensure the comfort of the passengers and the easy working of the vessel. The machinery consists of a set of surface-condensing side-lever engines, having cylinders 80 in. diameter, with 4 ft. piston stroke. They have been fitted by Messrs. Baird & Barnaley, of North Shields. Steam is supplied by two large cylindrical multitubular boilers. During the trial the machinery worked without the slightest hitch, and gave entire satisfaction to all concerned.

**Morven.**—On October 23rd the s.s. *Morven*, built by Messrs. Charles Connell & Co., Whiteinch, to the order of Messrs. James Gardiner & Co., Glasgow, went her trial trip. Her dimensions are:—Length, 344 ft.; breadth, 44 ft. 6 in.; depth, moulded, 28 ft. 6 in.; with a deadweight capacity of about 5,800 tons. She is fitted with all the most recent improvements for speedy loading and discharging of cargo, and with the best appliances for the safety and efficient working of the vessel. Her engines are of the triple-expansion type, having cylinders, 25 in., 40 in., and 66 in. diameter, stroke 45 in., with two single-ended boilers fitted with Howden's forced draught, have been constructed by Messrs. Dunsmuir & Jackson, Govan. The vessel proceeded down the Firth with the owners and a considerable number of friends on board, and, the weather being all that could be desired for the season of the year, the trip was a most enjoyable one. The speed attained on the measured mile was 11 knots, and throughout the trial the engines worked without a hitch, and everything was satisfactory. Immediately after the departure of the guests the vessel left for Cardiff, where she is to load coal for the Cape.

**Dolphin.**—On October 24th a new screw tug, classed 100 A1 at Lloyd's, built by Messrs. R. Craggs & Sons, of Middlesbrough, and engined by Messrs. Westgarth, English & Co., was tried at sea with very satisfactory results. Her dimensions are 90 ft. between perpendiculars by 19 ft. by 11 ft. The engines are of the triple-expansion type, and of 385 H.P. The speed developed was 11½ knots. The owner of the vessel is Mr. Alfred Watkins, of 58, Fenchurch Street.

**Donai.**—On October 24th the new steel screw steamer *Donai*, built by Messrs. R. Napier & Sons, Limited, for the Compagnie Messageries Fluviales de Cochinchine, completed a series of speed and consumpt trials on the Firth of Clyde, when all the conditions of the contract were amply fulfilled, a speed of a knot an hour in excess of the guarantee having been attained, while the consumpt was considerably less than what was stipulated. The *Donai* is the fourth steamer built by Messrs. Napier for the company, and like the others, is intended for their mail and passenger service in Cochinchine. The principal dimensions are:—Length, 220 ft.; breadth, 27 ft. 10 in.; depth, 14 ft. 9 in., with a topgallant forecabin, long-bridge, and full poop. The vessel and machinery have been constructed under special survey to the highest class at Bureau Veritas, and the latest improvements for efficiency and economy have been introduced. As the steamer is intended for service in an exceptionally hot climate the decks and wood fittings are entirely of teak, and the passenger accommodation has been placed on the upper deck to admit of good



ventilation; it includes very superior quarters amidships for the first-class, with a handsome dining-saloon in selected bird's-eye maple and mahogany, the state-rooms adjoining being extra large, and supplied with the most modern appliances for the comfort of the passengers; while in the poop there is a comfortable saloon and excellent state-rooms for the second-class. The machinery consists of a set of triple-expansion engines capable of indicating 800 H.P., with two single-ended boilers for a working pressure of 144 lbs. During the two days' trials there was an abundance of steam, and the engines worked very smoothly, without a trace of heating. The company was represented by M. Jules Rueff, managing director, who expressed himself as perfectly pleased with the steamer and the satisfactory results obtained at the trials.

**Marie Elsie.**—On November 8th the *Marie Elsie* went out into the bay off Hartlepool for her trial trip. She is a fine steel screw steamer built to the order of Messrs. Rodocanachi, Sons & Co., of London, by Messrs. Wm. Gray & Co., Limited. The vessel takes Lloyd's highest class, and her dimensions are:—Length, over all, 324 ft.; breadth, 44 ft.; and depth, 23 ft. 3 in. The deck erections consist of a half poop, bridge over machinery space, and topgallant forecabin. A handsome saloon and cabins for officers, &c., have been fitted up aft, the engineers' rooms are in the bridge, and the crew's accommodation forward, including a bath-room for seamen and firemen. The hull is built on the web-frame system with a cellular double bottom. Large hatchways, four steam winches, steam steering gear amidships, hand screw gear aft, two donkey boilers, patent direct steam windlass, boats on beams overhead, shifting boards throughout, stockless anchors, two masts with schooner rig, and complete outfit for a first-class cargo vessel have been fitted. The Central Marine Engine Works of Messrs. Wm. Gray & Co. have supplied the engines, which are of the triple-expansion type, of 1,100 H.P., with which have been fitted two large steel boilers working at 160 lbs. pressure. The engines were run for several hours at full speed without the slightest trouble of any kind. The trial was witnessed by Mr. Fickling, one of the directors of the company, Capt. Murrell, of the Shipyard, Mr. Mudd, of the Central Engine Works, and a party of ladies which included Miss Baines and Miss Wingate, of Glasgow. Immediately on the conclusion of the trial the vessel proceeded to Cardiff to take in her first cargo.

**Donegal Castle.**—On November 14th the steamship *Donegal Castle* proceeded on her trial trip. She was built to the order of Messrs. Pinkerton & Co., Londonderry, by Messrs. John Shearer & Son, Kelvinhaugh, Glasgow, and engined by Messrs. Hutson & Son. She is intended for a general coasting trade between Londonderry, Belfast, Dundalk, and Dublin. She proved herself to be a capital sea boat, and ran the nautical mile at a rate of fully 10½ knots. The owners expressed themselves highly satisfied with the results of the trial. Among the company were Mr. Pinkerton and Mr. Armstrong, of Messrs. Pinkerton, the owners, Bailie Paton, Mr. Hutson, senr., and Mr. Guy Hutson.

**Leven.**—On November 18th the steamer *Leven*, which has been built by Messrs. Scott & Sons, Bowling, underwent her speed trials at the measured mile on the Gareloch. The steamer has been built for the Dumbarton Steamboat Co., Limited, and is intended for their carrying trade between Glasgow and Dumbarton. The trials were very satisfactory, and a speed of 9½ knots was realised. The steamer then sailed to the head of the loch, and on her return journey dinner was served. The company was presided over by ex-Bailie Walker, Dumbarton.

**Puri.**—On November 19th the steamer *Puri*, built by Messrs. Gourlay Brothers & Co., Dundee, for the India General Steam Navigation Co., ran her trial trip. She has been specially built for the cargo and passenger trade between Calcutta and Chandballi, which is situated on the Hooghly, several hundred miles above Calcutta. A feature of the vessel is her exceptional speed. She is fitted with twin-screws, capable of propelling her at the rate of from 18 to 20 knots an hour. On the occasion of the trial run there was a stiff breeze blowing, which increased when the steamer crossed the bar. Notwithstanding the wind and a heavy swell on the water, the *Puri* went along at a rapid rate, and, considering that she was light, with remarkable steadiness. The intention was to have run the measured mile off Arbroath, but there was such a heavy sea that this was not carried out, and accordingly, after reaching the Red Head, the *Puri* was put about and headed for the Tay.

**Las Palmas.**—On November 20th the screw steamer *Las Palmas*, built by Mr. Robert Rodger, boatbuilder, Port-Glasgow, and engined by Messrs. Alley & Maclellan, Glasgow, went on her official trial trip. The conditions were that the vessel should steam six hours consecutively, and owing to the strong condition of the weather it was decided that the trial should be made upon the Gareloch. With a stiff south-easterly gale blowing the steamer made several runs upon the measured mile, when an average speed of fully nine knots was attained, which was considered highly satisfactory. The vessel measures:—Length, 60 ft.; breadth, 13 ft.; depth, 7 ft., and is supplied with compound surface-condensing engines. Among those present were Mr. J. A. Maclellan (of Messrs. Alley & Maclellan), Mr. Napier Messenger, Folkestone; Mr. Robert Rodger, Mr. David Houston, and others. The vessel is for towing purposes at Las Palmas, and Messrs. H. Alexander & Son, Glasgow, have contracted to deliver her at her destination. The owners are Messrs. Thomas Miller & Sons, Las Palmas, and were represented on the trial by Mr. Johnston, consulting engineer, Glasgow.

## Reviews.

*The Engineers' Gazette Annual and Almanac for the Year 1896.* London: The Tower Publishing Co. 1895.

THE present edition of this useful annual is greatly extended and enlarged. The number of useful "wrinkles" embodied in the volume seems to be substantially increased, but this is by no means the only improvement. A considerable amount of information most valuable to marine engineers regarding the Navy, the dockyards, various public offices more or less indirectly connected with the Royal Navy, such as the Woolwich Ordnance Department, the Hydrographic Department, and the R.N.R. are given. Much information too which is useful to men who spend much of their time in foreign ports may be noticed, as, for example, the lists of British Consuls, the Postal Guide and the tables of equivalent values for postal orders in various foreign post offices. Indeed the insertion of tables of ships building for the Royal Navy, of lists of British Yacht Clubs, and such like, tend to make the volume one which will be a book of reference to many outside the profession itself. The usual notes on current matters and the full accounts of the latest triumphs of naval architecture are included in the miscellany, and we are constrained to say that the editor will find his work cut out for him if he wishes to give his subscribers better value in 1897 than he has done for 1896.

*The Handling of Dangerous Goods.* By Joshua Phillips. London: Crosby, Lockwood & Co. 1895.

TO the ordinary practical man who is not a chemist, but who is interested in the work of the commercial world, and who wishes to be generally well-informed as to what is passing in the various trades and manufactures around him, it would have been difficult to recommend a more useful book. And yet the instruction of such a man is only a bye-intention of the present volume.

The writer is a gentleman whose previous works have been noticed in these columns. He is a chemist of great scientific attainments, and one who, in his official position to two of our greatest railways, has learnt to turn his scientific knowledge to the best practical account.

It has occurred to him that notes and instructions upon the properties of, and upon the safest method of handling those more dangerous goods which are every day passing from hand to hand by various modes of conveyance, will be a matter of public convenience. His work is directed to those who are charged with the transmission of such matters and also to the railway companies, steamship lines, insurance companies and ordinary carriers who are interested in their transportation. It will be seen that the design of the volume is excellent and, as far as we know, unique. Let us see how Mr. Phillips has executed it. He divides his volume into three parts. The first of these contains nine sections where "dangerous goods" are subdivided into classes. These comprise acids, alkalis, salts, gases, inflammable liquids, substances liable to spontaneous combustion, and explosives. Each individual substance under each of these classes is given by its scientific name. Then come the synonyms of that name, including its commercial

name and its chemical symbol. Then we are told shortly whence the substance is obtained, what are its characteristics and for what purpose it is commercially applied. Thus, if we see a steel cylinder, obviously charged with gas, at a railway station, and looking at the label find the consignee a dentist, we may presume that the contents are nitrous oxide gas. If the consignee be an optician the probability is that the contents are oxygen for the oxy-hydrogen gas in his magic lanterns. The notes on the gases are followed by an interesting account of the development of the gas cylinder, which now is so largely used and so seldom found wanting. The method of its manufacture and testing are given at length. When we come to the chapters on inflammable liquids we find much to occupy our attention. Of course, to us who are concerned with sea transport, the most interesting of these is petroleum. And here we find the regulations of the Birmingham Fire Brigade as to its storage, the precautions recommended as to the management of tankers, and the instructions as to the use of the Redwood apparatus for detecting the presence of inflammable vapours aboard tankers, as well as the Petroleum Act, 1879.

Under the title of explosives we find a list of what are considered to be in that category, a list of ports with importation licenses, and the text of the Explosives Act.

The second part will be found of most use to the carrier. It is headed "Instructive Accidents." Here various accidents with various dangerous goods are arranged in alphabetical sequence according to the name of the cause of the mischief. In each case the details of an accident are given and then follow the reasons which, it is supposed, made the accident occur.

That the book is up to date is shown by the fact that an incident which took place as recently as March, 1895, is pressed into service. These accidents show what precautions should be followed to avoid repetitions of the accidents narrated, and emphasize the weak spot in the temper of each of these uncertain servants of man so that those who have to deal with them in the future, may know how to avoid setting up undue irritation.

The third part of the volume contains information as to special railway classification, modes of packing, and general railway regulations as to such matters. Whilst in an appendix will be found tables, conditions of insurance, and information as to the transit of such commodities by sea. The whole is made easy of access by a good index. It will be seen then that Mr. Phillips has made good use of his knowledge in giving this volume to the world, and has, by doing so, contributed to the safety of workmen, sailors and travellers, as well as to the preservation of valuable public property.

*Transactions of the Institution of Naval Architects*, Vol. XXXVI.  
Edited by George Holmes, Secretary of the Institution.  
London. 1895.

This issue contains the papers read at the summer meeting held last year in Southampton, and at the usual London gathering in the April of 1895. It will be remembered that these transactions threw some important light on the progress of the day. The opening paper at Southampton was one read by Mr. John Dixon, the superintendent of the local docks, giving, as was very proper, some account of the history and future prospects of the port where the members and associates were being entertained. On matters of more general interest there were M. Normand's paper on the "Importance of Economy of Fuel in very Fast Vessels"—a matter of which the importance is self evident. For if there be no striving after economy in this direction the radius of action must be very limited and the craft's usefulness thereby much impaired. Incidentally we glean from the paper one or two very interesting details as to the practice in machinery construction in these great French works, as, for example, the fact that in some of his vessels the weight of engines and boilers has been reduced to 48 lbs. per I.H.P. maximum. This was followed by the statement that the machinery of the *Chevalier* and *Forban* is actually relatively lighter than this. This distinguished builder considers that at full speed an economy of fully 20 per cent. in fuel is obtained by the use of the feed-heater. His friendly rival on this side of the water, Mr. Thornycroft, followed with a paper on "Circulation in Water-tube Boilers in its bearing on Evaporative Efficiency." There, too, was read the much-discussed paper of Professor Biles on the "Design of Mail Steamers with a view to their use as Auxiliary

Cruisers." Many of the points he urges as advisable for adoption to render mail steamers more perfect as auxiliaries would tend to make them more nearly unsinkable in their ordinary work. The question involved in all this discussion as to private-owned ships is one which never occurs to the naval architect in regard to warships. We mean the financial question. The warship must be made as efficient as possible regardless of price. The mail steamer must be the best tool obtainable for her work, and the shipowner naturally considers that her first duty is to pay a return on what is invested in her. That mail steamers can be made practically unsinkable is obviously possible. But is it worth a private person's while to make them so for ordinary work? Vessels which can float with their two largest compartments open to the sea, may be near enough to perfection for ordinary sea risks, especially in these days when the science of handling steamers is so much improved, and when the lighting of our coasts and the instruments of navigation are so good. If the Governments require more than this in their possible auxiliaries they must be prepared to pay the extra first cost entailed, and to make good also the loss of income caused by a heavier and less capacious fabric in the ship. Thus the idea of double bulkheads in such vessels is possible of effect, but only at the Government's expense. Mr. Gross's paper on suction draught, with its results of experiments at sea with steamers in actual work, is well worthy of the attention of those who are interested in the boiler question.

In the second part of the volume, which relates to the meeting in London, Sir William White gives an account of the results of further experience with the *Royal Sovereign* class of battleship at sea. The great bilge keel question may be considered finally settled by his admission that the facts reported indicated conclusively the very great value of the bilge-keels in reducing the arc of oscillation of the *Republique*. The *Resolution*, without these bilge-keels, was kept as nearly as possible in the same condition of stability as the *Republique*. When in company, the maximum inclination to the vertical of the *Resolution* was 23 degrees, whilst her sister's was only 11 degrees. This test seems conclusive enough. An immense amount of labour and thought must have been expended over the paper on "The Elements of Force in a Warship," contributed by Vice-Admiral Colomb. His views and statistics, however, did not entirely commend themselves to the opinion of all the experts present, Lord Charles Beresford especially questioning the accuracy of figures and of conclusions alike. The important question of steamships also has a paper. The use of aluminium for the purposes of building small warships has attracted much discussion, and thus the account given by Mr. Yarrow of his practice and experiments are of that importance which must always attach to an expert's observation and deduction in the presence of those who are merely theorising. And the fulness and thoroughness of the discussion which ensued shows that the Institution itself was of this opinion. The tank steamer has inspired the subject of Mr. Hok's elaborate mathematical paper on the "Transverse Stability of Floating Vessels containing Liquids." The whole is another instance of the way in which the meetings of this Institution do public service, by giving the professional public facts and theories to digest and meditate upon with eventual benefit to the country at large.

*Manuale degli olii per lubrificazione*. By Salvatore Raineri.  
Turin. 1895.

This is a little volume by an author whose works we have favourably noticed on previous occasions. The subject with which he deals in this instance is one of considerable difficulty. But its importance is also very great. All engineers are aware of the very great loss of power by friction in marine machinery, even where the design and lubrication are of the best kind known to the science of the day. This matter is one of the most serious importance, for it is not merely a loss of power, bad as that would be. The power diverted from its proper purpose is not annihilated. It goes to do evil instead of doing good. Instead of driving the machinery and doing useful work it goes to prematurely wearing out the machine itself and thus it is a twofold source of expense. The question, therefore, of the best lubricants and of the best means of applying them are worthy of great attention, and we can hardly be surprised at the vast number of oils which, in every direction, are pressed upon the market.

Professor Raineri has again gone to every source of information possible. American literature equally with our own has

been laid under contribution, a fact which the writer is always ready to acknowledge. He gives the results of a large number of experiments as to the various qualities of different oils, and he examines various samples showing us the weakness and advantages of these characteristics. The means of applying the lubricants are not less important than the lubricants themselves, and this point too has his attention. As a practical work we can commend this little book to practical engineers.

## Correspondence.

[It must be understood that, in giving insertion to communications under this heading, we do not in any way pledge ourselves to the opinions preferred therein. We will with pleasure insert any letters likely to benefit our readers, either from their intrinsic value or as being calculated to promote such discussion as will elicit facts valuable from their being the result of practical experience.—Ed. M. E.]

### BELLEVILLE BOILERS.

To the Editor of THE MARINE ENGINEER.

SIR,—Having read with considerable interest the able Editorial Note on the Belleville boiler, which appeared in your last issue (page 301), I trust you will allow me to offer a few remarks on this, now, most absorbing subject.

Though I am not so prejudiced as to believe all the scathing things that have been said against this type of boiler, I candidly own that I shall wait for more of that data which, as you put it, "time will alone produce," before venturing to pronounce any decided opinion on its merits or demerits.

At present I am averse to these boilers because of the abnormally small water capacity; the special feed machinery, without which we are told they are practically useless; and on account of the extra care they require from both the engineering and stokehold staffs.

While many would have preferred the Admiralty to have hastened a little more slowly in fitting these, with us, comparatively untried boilers in some of our largest men-of-war, we cannot but admire them for the very decided manner in which they have backed up their opinions, and for patriotic reasons we all hope their judgment will not prove to have been too hastily formed.

There is one passage in your Editorial whereon, Sir, I beg respectfully to vary from you. Speaking of the feed-water being "sprayed" in amongst the live steam, instead of being pumped into the boiler water, you say, "Whether this heat be abstracted from the water contained in the boiler, or from the steam, is, we state, immaterial, so long as the steam is in direct contact with the water."

Now, Sir, in my humble opinion "this view is a fallacy."

Taking the steam pressure at 200 lbs. we have 382 degs. F. temperature. Now Schwachhöfer gives the specific heat of water at this temperature as 1.015, nearly, and the specific heat of steam at 382 degs. F. is .476.

Therefore, while 1 lb. of water contained in the boiler would yield up  $382 \times \frac{1}{1.015} = 376$  heat units to each incoming lb.

of feed, 1 lb. of steam would only impart  $382 \times .476 = 181$  heat units to the incoming lb. of feed. In other words while a lb. of feed would cool only .98 lbs. of the water  $\pi$  degrees it would cool 2.1 lbs. of the steam  $\pi$  degrees in passing to the same temperature, and as the quantity of heat given up by steam in liquification is equal to the quantity absorbed in its production, it appears to me that squirting the feed-water amongst the live steam is not by any means so economical a method of effecting its evaporation as passing it direct into the water contained in the boiler, to say nothing of the advantage to be gained by putting the feed into contact with the higher temperature of metal at the lower (nearer the fire) part of the boiler.

I am, Sir,

Yours obediently,

FESTINA LENTE.

**Water-Tube Boilers.**—The United States Navy Department are about to fit Babcock and Wilcox water-tube boilers on board the gun-boats now building. Three sister boats will at the same time be fitted with boilers of the ordinary type, and the working of the two varieties compared.

## Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from October 10th to November 13th, 1895.

- 18972 J. S. Raworth. Steam engines.
- 18996 C. H. Reed. Anchors.
- 19010 D. H. and S. Sansum. Lubricators.
- 19062 A. L. Hassard-Short and P. Dinkelspiel. Lifeboats.
- 19099 R. Elliott. Manufacture of tubes.
- 19107 H. A. Wheeler. Steam condensers.
- 19119 E. E. Wigzell. Trip gear for piston valves.
- 19287 T. R. Waite. Side propellers for vessels.
- 19305 W. L. Wise (J. MacCormack, United States). Steam boilers.
- 19306 M. Deane. Ships' ladder.
- 19392 R. Morley. Boat coverings.
- 19489 S. Alley and J. A. Maclellan. Steam boilers.
- 19491 J. S. Bicker. Tubular boiler.
- 19504 G. H. Jones. Protecting ships or vessels.
- 19529 J. P., W. N., and C. I. Haden, E. Hurn, and W. Wilkins. Pistons.
- 19542 H. W. Mason. Means for controlling torpedoes.
- 19558 J. Parkinson. Rowing-boats.
- 19594 J. H. Lee. Sea-going vessels and the like.
- 19618 E. Easton. Construction of graving docks.
- 19637 D. S. Kerr. Ships' davits.
- 19646 H. Benest. Veering drum for lightships.
- 19655 F. Kaufhold. Device for lubricators.
- 19660 J. W. Hamilton. Davits for ships' boats.
- 19664 J. S. Raworth. Packing rings for pistons.
- 19668 W. Jackson. Otter trawls.
- 19673 P. H. Allsopp. Thrust blocks for shafts.
- 19700 C. Gantier and X. Wehrli. Rotary engines.
- 19725 W. J. Wood and J. J. Dawson. Gangways for steam trawlers.
- 19728 T. Andrew. Construction of rotary engines.
- 19730 E. and A. W. Bennis. Steam boiler furnaces.
- 19773 M. Archer. Rowing boats and their oars.
- 19776 J. B. Archer and J. H. Blackburn. Propeller.
- 19795 P. T. Gill. Steam boiler flues.
- 19796 G. Glydon. Controlling the supply of steam.
- 19849 W. H. Curtis. Steam heaters.
- 19875 J. Gibson. Bell buoys.
- 19893 A. J. Boulton (J. E. and A. H. Gunther, Germany). Rotary engines.
- 19918 J. Caldwell. Steam steering engines.
- 19953 F. O'C. Prince. Internal combustion motors.
- 19963 W. T. Langley-Smith. Ships' paddle wheels.
- 19978 J. L. Jonsson. Governor for rotary engines.
- 19979 C. W. Thompson. Valves for engines.
- 20043 J. D. Churchill. Valves.
- 20044 J. D. Churchill. Multiple cylinder engines.
- 20055 C. E. Thompson. Governors for marine engines.
- 20110 J. Renton and Dickson and Mann, Limited. Friction clutches.
- 20132 J. H. Dunn and J. Parsons. Generating steam.
- 20134 H. Mork. Brake for pulley and rope tackle.
- 20141 O. Kuehl. Preventing the capsizing of boats.
- 20142 H. A. House, sen. Steam generators.
- 20169 F. B. Brown. Reversible screw propellers.
- 20187 A. Bonnotte. Screw propellers for ships.
- 20192 F. S. Pett. Loading and discharging vessels.
- 20202 W. Muir. Belting.
- 20217 W. Shearman. Preventing boiler incrustation.
- 20231 A. Wilson and F. Stubbs. Armour plates.
- 20271 T. Joyce. Lubricators.
- 20287 J. Batty. Pistons.
- 20312 C. V. Potter. Increasing combustion in furnaces.
- 20353 O. Pagan, J. K. Bougher, and H. Evans. Propellers.
- 20389 P. Jensen (R. Muller, Norway). Boiler tubes.
- 20402 D. R. Stettinius. Boilers.
- 20404 H. S. Pell. Boilers.
- 20414 A. J. Boulton (E. J. Muller, United States). Bearings.
- 20421 J. V. Grabinaki. Steam generators.
- 20423 J. Donaldson and W. O. A. Lowe. Furnaces and flues.
- 20426 P. C. Hewitt. Evaporators.

- 20477 H. M. Nicholls. Rotary steam engines and pumps.  
 20482 L. E. Muller. Heat non-conducting coverings.  
 20483 W. G. Gregory and A. Pillatt. Boiler furnaces.  
 20484 W. Eaves. Steam generators.  
 20497 A. C. Holzapfel. Preventing ships from sinking.  
 20524 G. Foulkes and W. T. Ellison. Indicating the revolution of a shaft.  
 20528 L. Lambrecht. Lifebuoys.  
 20561 Carron Co. and A. Robertson. Ships' berths.  
 20562 F. N. Butterworth. Slide valves.  
 20567 F. B. Brown. Screw propellers.  
 20600 R. J. Bott. Electric incandescent glow lamps.  
 20602 E. Smart. Projecting water from ships.  
 20627 W. Barber. Steam engines.  
 20634 J. Entwistle, R. Ibberson, and R. Wheeldon. Valves.  
 20641 R. Baird. Steam generators.  
 20645 E. N. Besant. Coiled tubular boilers.  
 20680 L. Clayton. Welding boiler-plates, &c.  
 20692 A. Sowerbutts. Ships and other floating bodies.  
 20701 H. J. and C. C. Marshall. Marine governor.  
 20720 J. R. Scott. Trawl nets.  
 20723 J. L. Grandison. Sight-feed lubricator.  
 20729 W. G. Wrench. Propellers.  
 20746 W. A. Dawkins. Pistons, plungers and the like.  
 20761 J. Hopkinson. Isolating valves for boilers.  
 20793 M. Oschatz. Steam boiler.  
 20813 D. S. Dark. Propellers for vessels.  
 20829 A. J. Marquand. Packing for steam engines.  
 20833 M. Clayton. Armour.  
 20839 W. Wills. Propeller.  
 20850 J. I. Thornycroft. Embarking on floating vessels.  
 20863 J. Shanks, jun. Ships' water-closets.  
 20866 J. Bonner, C. W. Mott, and H. Hermansen. Boilers.  
 20920 J. E. Hopkinson and R. Underhill. Valves.  
 20929 U. Prasse. Preventing collisions at sea.  
 20980 W. Ripper. Indicating steam temperatures.  
 20983 P. M. Justice (The Richardsen and Schröder Patent smoke consuming, fuel economising and steam boiler Co., Australia). Boilers.  
 21011 J. S. Hainsworth. Lever car.  
 21023 E. W. Killey. Feed-water filters.  
 21036 Wynn, Timmins & Co. Screw wrench.  
 21054 J. A. Hay. Locking nuts on screws.  
 21099 A. Hogg. Method of working a steam engine.  
 21101 W. W., A. H., and F. M. Boisset. Boats.  
 21106 H. Salisbury. Method of affixing lubricators.  
 21111 C. Cooper. Steering apparatus for ships.  
 21143 E. B. Charlton, jun. Valves.  
 21148 A. Mayhew. Couch for preventing sea-sickness.  
 21158 A. Lambie. Notching of ship's frames, &c.  
 21164 J. Shenton. Balancing slide valves.  
 21165 E. J. Duff. Treating exhaust steam.  
 21216 F. Ande. Tubulous boilers.  
 21252 M. Paul. Plural screw engines.  
 21257 A. D. Ottewell. Sight-feed lubricators.  
 21266 J. Shenton. Balancing slide valves.  
 21278 Tangye's Machine Tool Co., J. Tangye and W. H. Bailey. Pulleys.  
 21305 L. E. Clark. Floating docks.  
 21307 A. S. Field. Boilers used in war-vessels.  
 21310 W. P. Coleman. Propelling ships.  
 21315 W. Allen and L. C. Barker. Oil engines.  
 21325 W. Menzies and J. Stenhouse. Propeller shafts.  
 21359 M. Mollvain. Steamers.  
 21361 J. S. L'Hommedieu. Wrenches.  
 21372 B. J. B. Mills (Messrs. H. Sâtre et Fils, Aine, France). Superheating steam.  
 21435 E. Fielden. Furnaces of steam boilers.  
 21466 H. C. Ashlin. Steam generators.  
 21481 C. A. Jensen (F. W. Cross, United States). Watertight doors for ships.  
 21483 E. G. McAuley and L. B. Fulton. Feeding water to boilers.  
 21489 J. Cohrs. Trawl nets for fishing.  
 21495 A. E. Ash. Stoking marine boilers.  
 21510 T. Beeley. Steam generators.  
 21541 A. von Kovais and S. Binnel. Water-tube boiler.  
 21576 A. Goodwin. Engine governing apparatus.  
 21584 J. E. Baker and F. Jones. Piston packings.  
 21592 E. Box. Controlling floating docks, &c.

## BOARD OF TRADE EXAMINATIONS.

## EXTRA FIRST CLASS.

October 26th, 1895. McLeod, D. B. Ex. 1C Leith  
 November 9th, " Elvidge, Ernest Ex. 1C "  
 " 16th, " Gray, G. M. Ex. 1C London  
 NOTE.—1C denotes First Class; 2C, Second Class.

October 26th, 1895.

Baskerville, C. ... 2C Liverpool  
 Gomersall, J. T. 2C London  
 Hill, Thomas .. 1C Liverpool  
 Jones, Charles J. 2C "  
 Kennedy, R. A. 1C London  
 Lelean, M. C. .. 2C Falmouth  
 Martin, J. C. .. 1C London  
 Nicol, J. W. .... 1C "  
 Stephens, H. E. 2C "

November 2nd, 1895.

Anderson, M. ... 1C Glasgow  
 Avers, J. W. ... 2C N. Shields  
 Barr, R. .... 1C Glasgow  
 Bell, J. .... 1C N. Shields  
 Blacklock, T. ... 1C "  
 Brosinovich, H. 2C London  
 Burtt, T. J. .... 1C N. Shields  
 Darling, W. .... 2C Glasgow  
 Dixon, J. R. .... 1C N. Shields  
 Hamilton, R. W. 1C Cardiff  
 Hopper, J. .... 1C Glasgow  
 Johnson, T. W. 2C London  
 Kidner, Charles 1C Liverpool  
 Lang, J. .... 1C Glasgow  
 Lethbridge, J. ... 1C N. Shields  
 Meikle, J. D. ... 2C Glasgow  
 Miskin, W. W. ... 1C London  
 Newman, A. ... 1C "  
 Nielson, Bjorn. 1C N. Shields  
 O'Neill, F. R. ... 1C "  
 Parkhill, J. .... 2C Glasgow  
 Price, Robert .. 2C Liverpool  
 Price, S. A. .... 2C Cardiff  
 Reid, J. R. .... 2C "  
 Robinson, G. ... 1C N. Shields  
 Scott, W. .... 1C Glasgow  
 Stokes, J. H. ... 1C London  
 Waddle, T. F. ... 2C N. Shields  
 Williams, Philip 1C Liverpool

November 9th, 1895.

Berry, Austin .. 2C Liverpool  
 Broadbent, H. ... 1C N. Shields  
 DeRitter, S. C. ... 2C London  
 Dunnett, W. ... 2C "

Fairhead, R. ... 2C N. Shields  
 Griffith, John .. 2C Liverpool  
 Harvey, W. J. ... 2C London  
 Harwood, Ralph 1C Liverpool  
 Hegg, T. J. .... 2C London  
 Henderson, J. ... 1C N. Shields  
 I'Anson, T. C. ... 1C "  
 London, H. M. ... 1C "  
 Mayfield, C. A. ... 2C London  
 McNaugh, R. ... 2C Hull  
 Pritchard, R. ... 2C Liverpool  
 Sourr, W. .... 2C N. Shields  
 Smith, John ... 2C Liverpool  
 Stevens, J. A. ... 2C London

November 16th, 1895.

Black, J. .... 1C Greenock  
 Bunting, W. ... 2C Dublin  
 Cannell, W. H. 1C Liverpool  
 Chapman, J. S. ... 1C Greenock  
 Chisholm, J. ... 2C Dublin  
 Clark, W. .... 2C Greenock  
 Doble, Wm. J. ... 2C Dover  
 Ewing, W. .... 1C Leith  
 Forbes, N. S. ... 1C Greenock  
 Francey, A. .... 2C Dublin  
 Granger, H. W. 1C Leith  
 Grant, J. .... 1C Liverpool  
 Higgins, P. J. ... 1C "  
 King, A. .... 2C Greenock  
 McCallum, G. C. 1C Liverpool  
 McFarlane, A. ... 2C Greenock  
 McGowan, G. W. 1C "  
 McIlroy, Hugh. 1C Liverpool  
 McQueen, D. ... 2C Leith  
 Millar, J. .... 1C Dundee  
 Pemberton, J. B. 1C Liverpool  
 Primrose, J. L. 1C Leith  
 Sanson, D. T. ... 1C "  
 Stanley, W. H. ... 2C Liverpool  
 Tasker, J. .... 2C Dundee  
 Townsend, D. ... 1C "  
 Vaughan, F. G. ... 2C Dublin  
 Williamson, J. ... 1C Greenock  
 Young, J. M. ... 1C Liverpool  
 Younger, A. S. ... 1C Greenock

**A One-sided Floating Dock.**—We are informed that the Lindbergs Shipbuilding Co. of Stockholm, have just commissioned Messrs. Clark & Standfield, of 11, Victoria Street, S.W., to design for them a one-sided floating dock, to be built in two parts capable of lifting together vessels up to a dead-weight of 2,000 tons. This will make the tenth of this one-sided type of dock that this firm has now either built or designed, and it may be advanced as a proof of the growing favour with which these modern forms of floating docks are being received that at the present moment this firm are either constructing themselves or having constructed from their designs floating docks of an aggregate lifting power of close on 15,000 tons.

**Steel Steam Yacht.**—The plans for a steel steam yacht, which Mr. Geo. L. Watson, the famous designer, is preparing for Mr. Anthony Drexel, of Philadelphia, are for a vessel that will be among the largest pleasure craft afloat. The vessel will have twin screws, will be 290 ft. long, and will cost £100,000. The crew will number about eighty. Upon completion of the vessel, about June next, Mr. Drexel will start on a cruise around the world. She will be built by Messrs. Inglis, of Pointhouse.

# The Marine Engineer.

LONDON, JANUARY 1, 1896.

**H**ITHERTO the question of torpedo-boat destroyers appears to have only been discussed from the one side, and that side the favourable one. That these vessels are magnificent specimens of a type calling, in both their inception and construction, for the exercise of the highest intellect and greatest skill of designer and builder alike, or that they embody every device and improvement which such skill can alone suggest, we do not in any way, or for one moment, wish to doubt, but it appears to be a matter of question in many quarters whether, regarded simply as weapons, they are really worth the large outlay their construction entails. It appears to be the opinion of several eminent naval officers, with whom we have spoken on the subject, that, considered as a means of torpedo offence, they would prove less useful than a first-class torpedo boat, their greatly increased "target area" more than counterbalancing any advantage from the two or three knots' extra speed, attained only by excessive forcing, while in common with the less costly, smaller, and therefore more difficult to hit, torpedo boat one well-directed shot from a large gun would simply mean annihilation in either case. Taking, probably, the most perfect specimen of her class, we find that she carries 60 tons of coal, no less than one-quarter of her entire sea-going displacement. When going full speed, under trial trip conditions,  $3\frac{1}{2}$  tons of coal disappear per hour, thus reducing her full-speed radius of action to, say, 17 hours' steaming. Given, say, only a three days' cruising at sea and even a 30-knot boat might find that "the race is not always to the swift." From the published reports of the trials of several of the later boats we find that to attain the top three knots meant 50 per cent. increased expenditure of fuel, and though 50 per cent. extra is a very heavy draft to draw on the bunkers for such an increase, it is, of course, in these vessels and under exceptional circumstances justifiable, though every hour at the higher speed means rapid depletion of the bunkers, and consequent quick approach to uselessness and danger of destruction or capture by a more powerful vessel. As regards their powers of defence it would appear that some commanders in command of a "destroyer" would hesitate before attacking more than two torpedo boats, and would rather expect to come off "second-best" in an encounter with two first-class boats, each mounting the same armament as the "destroyer," well placed on opposite beams, and skilfully handled

by determined men, for if they did not quickly disable or sink her by the concentrated fire of their quick-firers they would, acting in concert, have double chances of soon settling the matter by one or the other, or both of them adopting running-down tactics.

THE relation between capital and labour, both at the moment and in the near future, gives food for anxious thought to all interested in the iron and steel industries. Mr. F. Monks, J.P., of Warrington, in an address at the annual dinner of some twenty members of the Iron and Steel Institute, held in commemoration of a pleasant social time enjoyed by these members in a special car reserved to them on the occasion of the visit of the Institute to America in 1890, has expressed some opinions on the subject that are well worth transcribing, and which we could wish should come to the knowledge of any working man held at present in the iron thralldom of the New Trade Unionism. At a time when a most serious depression in all trades is now relieved by a prospect of brisker demand, capitalists are looking round to see how best they may prepare to secure for our island a suitable share of such increased trade. Fifty years ago lower wages for labour, and higher prices for food and clothing were prevalent throughout these isles, causing much suffering in bad times to the unemployed, and even in brisk times giving them but a bare command of necessities. Now that Free Trade has so long ruled this realm for the benefit of the masses, and at the expense of traders, landowners and merchants, the price of all necessities, and even luxuries, have never been so moderate. This was effected with a view to provide better living for the working classes even at more moderate wages, so that by the low price of labour we might always successfully compete with foreign rivals. Has this been the result? Far from it. Though the cost of living, bread, meat and clothing has never been less, we find no appreciation of these facts among the working classes. They steadily advance their standard of a minimum living wage, and apparently would rather starve, with no employment at all, than avail themselves of the low price of commodities to work cheaply, and thus retain a supremacy in the productive markets of the world. The political and educational standard of Great Britain has advanced by leaps and bounds, so it is to be hoped that some day the working man will learn the first lesson of political economy, that a living wage is to be measured by what it will fetch, and not by its nominal value in pounds, shillings and pence. Mr. Monks has full confidence that we are on the eve of better times. He points to the enormous production of gold, present and prospective, giving



purchase power to the nations which are absorbing it; the immense development of agriculture all over the world putting our puny production in Great Britain, with high rates, rents and taxes, quite into the shade, but creating wants in the meat, butter and wheat producing countries, which we should be prepared to supply by our manufactures; the emigration from the older countries to the new developing their industries and populations having wants which must be supplied from the older manufacturing centres; the development of railway enterprises in the older and hitherto inaccessible countries of the East, teeming with population, causing development in the commercial marine destined to carry and interchange such products at a reduced cost never before realized. Whether this return to prosperity will be long or short depends upon many things over which we have no control. If peace be maintained the improvement will be probably steady and continuous, but to what extent we shall be able to share in it will depend in a large measure upon the relations of labour to capital. The tendency is for labour to claim a larger share of results, because it regards the mere physical power required as the most important element, undervaluing the other two components of success, capital and the mental insight and capacity to control both with an energy that never flags. The spirit of fair-mindedness, which will make it content with its own fair share of the result, is not a characteristic of the present Trade Unionism, and we see little tendency to any action which will permanently reconcile both capital and labour upon an equitable basis. The methods now adopted by the New Unionism to enforce the demands of labour seem to be only destructive of the true liberty and freedom of action which has won for British labour its pre-eminent position in the world, and will only lead to combinations of capitalists in self-defence bringing upon the labourers an amount of suffering and impoverishment of which the present generation has no conception. It has lowered the moral tone of the British workman, and reduced him to the level of a mere machine in his obedience to the directions of the so-called leaders, compelling him to inflict hardship and an amount of injustice upon others of his own class, which he himself would be the first to denounce as an intolerable tyranny if applied to himself. What has he done for himself but to attempt to enforce upon employers the same rate of wages to the most idle and dissolute as to the most skilful and intelligent workman, permitting no recognition of conscientious work, and compelled by fear of the boycott to submit to rules and demands utterly opposed in many cases to his own sense of what is right and reasonable? One fact which Trade Unionism fails to recognise is that by its attempts

to reduce all men to one uniform level, and to render blind obedience to mandates against their own sense of fair dealing, it forces every really capable mind to seek its development outside its influence. It is to be hoped that the secession of the best and most capable will reduce the present tyranny to that for which only it is fit, the holdfast of those who cannot rise or succeed by their intrinsic merits, and who are thus usually unwilling to let others do the same.

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THE report of the Chief of the Bureau of Steam Engineering in the United States Navy is of general interest, apart from the mere details of expenditure and of contracts completed and undertaken, chiefly in regard to the indication it affords of the development of marine engineering up to date in the United States. The present development in construction appears to be in the direction of torpedo-boats, gunboats and tugs, as we see only two new battle-ships referred to. The water-tube boiler mania has already seized upon this department, but curiously enough, with less force than with us. Whilst the Bureau admits a necessity for a type of boiler lighter than the Scotch or cylindrical fire-tube boiler, it apparently strongly considers the necessity of proceeding with caution, and is not disposed to adopt a new water-tube type for large or important vessels of the Navy, but will confine its experimental work in this matter to torpedo-boats, gunboats, and the smaller cruisers. It is strange to see an American institution more conservative and cautious on such matters than the British Admiralty. The Bureau goes so far as to state that no single type of water-tube boiler has yet made its appearance which can be regarded as an altogether satisfactory substitute for the Scotch pattern. They admit, however, that there are to-day, we presume in the States, a large number of water-tube boilers that have attained a commercial success on shore. Owing to the facilities in America for the large supply of petroleum, the Bureau recommends exhaustive experiments to ascertain its value for torpedo-boats and the smaller types of vessels, which should include tests, not only for efficiency, but for the endurance of the burners, and for the effects of various fuels upon the tube-plates and ends. We see that already a torpedo-boat belonging to the Maine is being tested for this purpose, and the trials should give valuable information to all who can command liquid fuel. It is suggested that tests should be directed to ascertain how much increased power over natural draught might be secured by burning liquid fuel in conjunction with coal. Many of the older vessels of the United States Navy are now obsolete as regards their engines, and with worn-out boilers, though the

hulls are reported to be in good condition, and many of these vessels are to be converted into twin-screw steamers, with new boilers and high-expansion direct-acting engines. The reduction in the weight of engines by modern designs will give these old vessels much greater coal-storage, and, it is estimated, an increase of 2 knots in speed. We are sorry to see that the supply of cadets from the Naval Academy for vacancies in the engineer division is inadequate, and recruits must be sought elsewhere from colleges and technical schools.

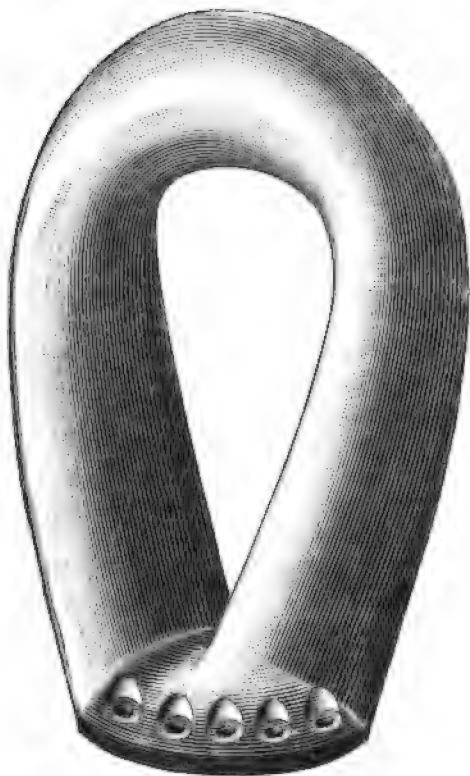
THE strife between capital and labour on the Clyde and in Belfast is still holding its disastrous course. The offer made by the associated employers has been refused by the large majority of the members of the Amalgamated Society of Engineers, although it represents a definite advance above the rates paid in the past period of depression. We fear the time just before the Christmas holidays was ill chosen for any serious consideration by the men of a fair compromise between their absurd demands and the old scale. A week or two's work, with reserve held in hand and an enforced though usual holiday to follow over Christmas and the New Year, would have given the men but little, if any better, return than strike pay, and this very personal argument as to their pockets was no doubt clearly before the men's minds. Mr. J. Stafford Ransome, A.M.I.C.E., has been commissioned to report to the Iron Trade Employers' Association as to the course of conduct and present situation of the present disputes at Belfast and on the Clyde. The report puts the case of the workmen in such a position that it would appear that their action has been very ill-advised and not warranted as yet by any substantial increase of trade or profits to the employers. Mr. Ransome points out that it is not a shipbuilders' strike at all, but an engineering strike pure and simple in both places, and has been brought about by the Amalgamated Society of Engineers. The original *casus belli* seems to have been a statement by a local official of the society that a rise of 2s. to restore wages to the maximum rate of former times had been promised by the Belfast masters for this period. When such promise was repudiated by the masters the society has entirely failed to substantiate the statement, and the local official appears to have admitted that the alleged promise was made by an individual master in the course of a private conversation. If qualified by a proviso as to the state of trade or prices, we have no doubt such an undertaking would be gladly entered into by the employers, and, in fact, was a part of their offer. As regards the lock-out on the Clyde, it is pointed out by Mr. Ransome that the Clyde masters were already face to

face with the same demand as the Belfast firms, and that the employers' lock-out affected only 300 hands, though the following strike brought out over 3,000 men by their own action. For the men to attempt to claim at this moment to come back to the maximum rate prevailing in 1890 and 1891 is absurd, if they would only study the pages of this journal and compare the enormous activity of those years in the shipbuilding world as compared with the present production. We have published statistical diagrams of shipbuilding production in Great Britain and throughout the world, and we have no doubt the employers would gladly adopt a sliding scale of wages, following such statistical diagrams of general production. As in 16 cases out of 26 in the Glasgow district trade was reported by the secretaries of the Union to be "bad" in July of 1895, and in the other 10 cases only "moderate," it is absurd for the Union to take ground that any improvement since taken place would justify an immediate rise to a maximum wage. We understand that this demand was first made in August of this year, which, immediately following their own reports of bad and moderate trade, only makes the action of the Union still more indefensible. We wonder very much what the old members of the Union, who have been subscribing for the best part of their lives with a view to superannuation allowances, will think of the depletion of their security for such payments when the time has arrived for calm reflection as to what they have gained and lost by this bitter strike. It is all very well for the young members and those lately joined, who have not been at the cost of forming the accumulated funds, they have probably obtained a fair return by strike pay for their investment, and if they have no families dependent upon them can regard it as a not unpleasant holiday; but we are sorry for the older and married members who are so ill-advised as to allow the funds, which should have been their stay in old age or sickness, to be squandered in a fruitless struggle with the inevitable laws of supply and demand. We never knew a strike yet in a falling market that ever gained a rise of a farthing for the men, nor in a rising market that ever gave the men more than the employers would have gladly given them without the strike. Perhaps the men will some time see that it is only the professional agitator who certainly benefits by such a struggle, as it may be equally truly said that it is only the lawyers who profit by litigation.

**New Guns.**—The *Aurora*, cruiser, at Devonport, has been re-armed, 10 6 in. quick-firing—converted—guns being mounted in lieu of her 6 in. breech-loaders. It has been decided to replace all the 6 in. breech-loading guns in the service by those of the converted type, and the *Aurora* is the first vessel in which the alteration has been made.

### THE MYERS SCREW PROPELLER.

**S**CREW propellers are amongst the most fertile field for inventors' ingenuity, but it might have been thought that all possibilities of fresh departure



BLADE.

had, by this time, been exhausted. This is, however, not the case. We have pleasure in illustrating herewith what may be characterized not merely as a modification, but a new departure in screw propellers.

This is the Myers Propeller, the property of the Myers Screw Propeller Syndicate, Limited, 38 and 40, Lloyd Street, Manchester, the invention of Mr. Charles Myers, of Manchester, late of Glasgow, and which has now proved itself in two to three years' tests, to have several features of advantage as compared with the old propeller.

From our illustrations it will be seen that the blades are practically increased to six, but that each pair of adjoining blades, placed in echelon to one another as regards the plane of rotation, are united at the periphery by a lateral extension of the outer ends of the two adjoining blades to one another, with an open loop between. This is not a large blade with a hole through it, as in that case the stream of water through the hole in the blade would pass the edges of the hole at right angles to the edges, which would much retard the flow, and tend to cut up the passing streams.

The Myers propeller blade is essentially a combination of two blades, each reinforcing the action of the other, and conjointly by the inclined faces about the loop, producing a true propulsive effect upon the streams of water passing through the loops, and thus driving backwards, with least disturbance, a con-

tinuous flow in the line of the keel. This, it is well known, theoretically, is a true test of efficiency.

We consider also that each pair of looped blades, by their peripheral connection serve to gradually set in motion the column, the pitch of the arch gradually coming up from a fine to the full pitch, and thus serving to set the rearward column of water into motion gradually, and thus again with great efficiency.

Again, we have always held that, as a rule, ordinary propellers are deficient in surface; but it has not been easy to increase the surface without undue increase of diameter, and thus getting the upper blades into broken water. The Myers propeller seems to have solved this difficulty, and we are, therefore, not surprised to see that the company can produce many important certificates as to an actual increase of from 10 to 15 per cent. in efficiency for their propeller as compared with the ordinary screw.

The form is evidently one in which the shock upon the water is most gradual, easy, and distributed over a large surface. The tendency to vibration of a blade, supported only at one part to the boss, which is analogous to the leg of a tuning-fork, is entirely obviated by the arched connection of the upper parts of adjoining blades, and stiffness of structure is also given by the disposition of the juncture of the bottom of the blades to the boss in echelon, and at an angle of considerable obliquity to the main part of the arch. The looped blade is thus a scientifically braced structure, and is excellently adapted to give the certified



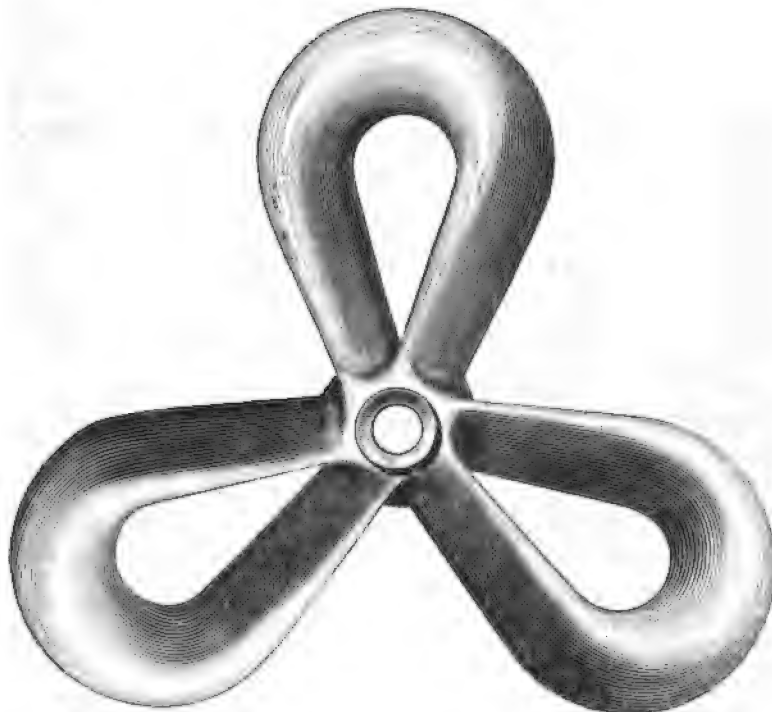
TOWING PROPELLER.

results of removing all vibration upon the bearings and hull when in work.

The grip upon the water is obviously so great that

a steamer fitted with this propeller can stop from full speed almost in her own length, driving astern as powerfully as ahead, and, as might be expected as a consequence, the power to manœuvre and steer is made much more sensitive. In the action of steering there is no doubt that the current of water driven through the loops close to the stern post and rudder will cause the boat to answer its helm much more smartly.

As there can be no collection of dead water or vacuum behind these looped blades it is stated that this most fruitful source of pitting is avoided.



PLAN.

The strength and durability of the blades under heavy shocks from the seas is obvious from the character of their structure, and from the fact of the apertures and angular faces there-about affording an issue to any impinging sea.

The quiet action of this propeller on the water renders it most beneficial for use in canals, and we understand this propeller has been adopted on the passenger boats of the Irwell Steam Passenger Co., plying on the Manchester Ship Canal, who record a considerable increase of speed and greater command of the steamers.

We understand also that the French Admiralty have tested these propellers with great satisfaction and good results, and are intending to adopt more of them.

The propeller is at present on exhibition at the National Trades and Industrial Exhibition, Glasgow.

## INSTITUTE OF MARINE ENGINEERS' CONVERSAZIONE.

THE seventh annual conversazione in connection with the Institute of Marine Engineers was held on Friday, Dec. 6th, at the Stratford Town Hall, when, as in previous years, there was a very considerable attendance of members and friends. The large hall, the Council Chamber, the Mayor's parlour, and several other apartments had been placed at the disposal of the committee for the evening, and very adequate arrangements were made for the entertainment of the company during a period which extended from 6.30 p.m. until 3 o'clock on Saturday morning. The large hall had been most tastefully decorated with bunting, flowers, palms, and other foliage plants, and arranged

round the room and in other parts of the building there was a very interesting collection of exhibits, kindly lent for the occasion, of numerous appliances and manufactures connected directly or indirectly with marine engineering. The Silvertown Electric Telegraph and Cable Co. contributed a most comprehensive collection, which comprised telegraphic instruments, telephones, galvanic batteries, many curious specimens of submarine cable, and india-rubber and ebonite goods in infinite variety. Mr. Yarrow sent a working model showing his method of balancing engines, and on an adjacent stand there were several working models of Harfield's compensating steering gear. The other exhibits included Rae's patent jointing shackle for chain cables, specimens of Lion metallic packing, drawings of a Belleville boiler, lent by Messrs. Maudsley, Son & Field, Dewrance's safety water-gauges, &c., Ruthven's hydraulic propeller, Railton & Campbell's filter, Smeltic copper-pipe, spirally wound (specimen), and engravings by the Swan Engraving Co., a host of pictures of warships and other marine subjects; and a very curious drawing of a mine, the work of a Chinaman. A constant centre of interest during the evening was a working model of Thornycroft's water-tube boiler, shown under steam. This is the same model that was explained by Mr. Thornycroft at Westminster to the members of the two Houses of Parliament, and is fairly representative of the type now so largely used in torpedo-boat destroyers. At seven o'clock an excellent concert was given in the large hall, under the very competent direction of Mr. John Bennett, who was assisted by Mr. E. Burchill, Mr. R. J. [illegible], and Mr. Frederic

Russell, Mr. J. M'Auliffe, Miss Louise Jenkins, Miss Ada Smith, Mr. A. Hurley and Mr. T. F. Noakes. At 9.30 the hall was cleared for dancing, and a capital programme was not concluded until the early hours of the morning. Mr. A. J. Durston, C.B., the President of the Institute, attended, and was very warmly greeted on his arrival. The arrangements for the entertainment were carried out by the recreation committee, under the con- vnership of Mr. C. L. E. Melsom. Mr. G. Wiltshire, as in previous years, was an efficient M.C., and the following gentlemen acted as stewards:—Mr. James Adamson (hon. secretary), Mr. J. M'Farlane Gray, Mr. J. G. Hawthorn, Mr. J. B. Johnston, Mr. B. Leslie (hon. treasurer), Mr. G. W. Newall, Mr. C. G. Newby (assistant secretary), Mr. A. W. Robertson, Mr. J. R. Ruthven, Mr. F. W. Shorey, Mr. J. T. Smith, Mr. J. H. Thomson (chairman of the Council), and Mr. W. White. There were also present, among many others, Mr. G. W. Manuel (a past president), Mr. Alderman G. W. Kidd, Mr. Archibald Thomson, Mr. John Adamson, Mr. Blleloch, Mr. C. Noble, Mr. S. C. Sage, &c.

### LAUNCH OF H.M.S. "DIANA."

**H**M.S. *Diana*, the second of the two British cruisers built by the Fairfield Shipbuilding and Engineering Co., Limited, was successfully launched from their yard at Govan, on the 5th ult. The day was far from being an ideal one for an important launch, as a gale blew the greater part of the forenoon and early afternoon, and fully an hour before that fixed for the ceremony both banks of the river were submerged in water. As all the shipyards in the vicinity were at a standstill in consequence of the storm, there was an unusually large number of spectators, apart from those who were present on the invitation of the builders. Previous to the launch—which was delayed some time on account of the high tide—a brief religious ceremony was conducted by Dr. John Macleod, of Govan, after which Lady Bell, amid cheers, performed the christening ceremony, the cheering continuing while the magnificent ship glided down the ways. In the launching of this vessel—the sister ship of which—the *Venus*, was launched on September 5th last the Fairfield Co. has fully maintained their reputation for rapid production, as of the six ordered from private yards, the Fairfield two are the first to leave the ways.

H.M.S. *Diana* is a cruiser of the *Talbot* type, and is 350 ft. long between perpendiculars, 54 ft. in extreme breadth, and has a displacement of about 5,600 tons. She has a cellular double bottom extending from stem to stern, and the hull throughout is subdivided into watertight compartments. While the hull is of steel, sheathed above the water line with teak, the stern post, rudder, struts, and stern are of phosphor bronze. There is an armoured deck of steel, covering the vital portions of the ship, such as the boilers, machinery, and magazines. In addition, there is an armoured citadel of Harveyised steel to protect the engines from raking fire. Speed being of primary importance in vessels of this class, the *Diana* will be fitted by her builders with two sets of triple-expansion engines, to drive twin-screws, capable of developing 9,600 H.P. with a moderate allowance of forced draught. With a clean bottom, and under favourable conditions as regards weather, the speed expected is 19.5 knots. Steam will be supplied from eight single-ended boilers of the ordinary Navy type at a pressure of 115 lbs. per square inch. The coal capacity is nominally 550 tons, but provision has been made for carrying a greater quantity if necessary. Her armament will consist of five 8-in. guns, six 4.7-in. guns, eight 12-pounder guns, and a number of smaller quick-firing guns. Forward there are two torpedo tubes submerged, and aft one above the water line. She will carry 450 officers and men.

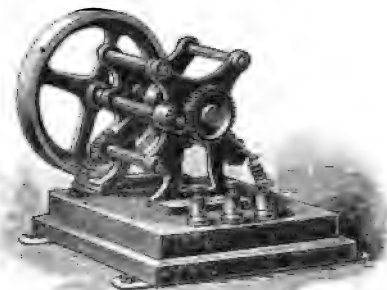
After the launching ceremony, the company adjourned to the drawing office, where cake and wine were served. Sir William Pearce presided. He was accompanied by a large and distinguished party, among those invited being Lord and Lady Blythwood, Sheriff Berry, Commander Deverell (Empress) and Mrs. Deverell, Sir William Orr-Ewing, Bart., Lord Provost M'Donald (of Edinburgh) and Mrs. M'Donald, Colonel J. M. and Mrs. Forrester, Mr. W. W. Harris (of H.M.S. *Diadem*) and Mrs. Harris, Lord and Lady Kelvin, Provost and Mrs. Kirkwood (Govan), Sir John Stirling-Maxwell, M.P., and others. The following gentlemen represented the Fairfield Co.:—Sir W. G. Pearce, Bart. (chairman); Richard Barnwell

(managing director), the Right Hon. Sir William T. Marriott, Sir William Arrol, M.P.; Dr. Francis Elgar, Edmund Sharer (shipyard manager), and George Strachan (secretary).

The chairman then presented Lady Bell with a massive silver casket, containing the mallet with which she performed the ceremony, as a souvenir of the event. The mallet is of ivory, beautifully carved, and mounted with the monogram of Lady Bell. It was fitted into a magnificently chased silver casket, the several plaques of which were illustrated with scenes suitable to the occasion and having a local interest. It was inscribed—"Presented to Lady Bell, the wife of the Honourable the Lord Provost of Glasgow, by the Chairman and the Directors of the Fairfield Shipbuilding and Engineering Co., Limited, on the occasion of the launch of H.M.S. *Diana*, 5th December, 1895." It was specially designed for this occasion, and manufactured by Messrs. R. Stewart, of Argyle and Buchanan Streets, silversmiths to Her Majesty.

### WALKER'S PATENT ENGINE SPEED INDICATOR AND RECORDER.

**A** RECENT inspection of one of the Walker "Recorders" at work, warrants us in asserting that it is a simple and reliable means of indicating to the officer on the bridge the direction and speed of rotation of the main shaft, and as the instrument conveys to him both ocular and aural demonstration, should any order have been misunderstood in the



engine-room he can at once take the requisite steps for rectifying the error, and so avert any impending disaster.

The instrument is actuated electrically, the current being supplied from a battery or other suitable source of electricity; the terminals of the "Recorder," shown in the larger figure, being connected by insulated cables to the terminals of the engine-room contact maker, shown in the smaller figure. The pulley of the contact maker is driven by a strap from the main shaft and rotates, by means of the gearing shown, a spindle carrying a two-part commutator, having brushes so arranged that each rotation of the main shaft transmits, according to whether it is running "ahead," or "astern," an electrical impulse to the corresponding needle and bell of the recorder.

A main switch placed on the column carrying the recorder admits of it being thrown in or out of circuit as required, while two smaller switches, placed one on either side of the cylindrical head, allows of one or both of the bells being silenced if desired.

Assuming the order to go "ahead" has been given, and by some error the engines have been put "astern," each revolution of the engine would cause a swing of the "astern" needle, and a stroke on a deep-toned bell to be given, while further the figures of the



counter would indicate the number of revolutions run. If the order had been correctly carried out the "ahead" needle would have vibrated once for each revolution of the engines, and a corres-



ponding number of strokes on a shrill-toned bell would have been given.

Thus in the darkest night, or thickest weather, and without having occasion to remove his eyes from the look-out point, the officer in charge at once knows whether his orders have been correctly carried out, and, having assured himself on this point, he can either silence the bell, or throw the whole instrument out of circuit until again required, a small disc remaining *in situ* to show the direction in which the engines were last running.

The manufacturers, Messrs. Henry Hughes & Son, of 59, Fenchurch Street, E.C., have submitted to us numerous favourable testimonials regarding this instrument, received from captains, engineers, and pilots, and inform us that one of the latest orders placed with them is to fit the instrument on Mr. Gordon Bennett's new s.s. yacht.

## WATER-TUBE BOILERS.

At a meeting of the Institute of Marine Engineers, held on December 9th, at the Institute premises, 58, Romford Road, Stratford, Mr. J. I. Thornycroft delivered a descriptive lecture on the Thornycroft water-tube boiler. The President of the Institute (Mr. A. J. Durston, C.B.) occupied the chair, and there was a crowded attendance, the large hall being filled to overflowing. Mr. Thornycroft, in the course of his lecture, said:—It should be understood that this particular type of boiler was designed for torpedo-boat work, the locomotive type which followed the earlier type of marine boilers having failed to stand the hard forcing necessary to obtain the high speed required in these boats. It must also be clearly pointed out that in describing its merits for the particular use for which it is so successfully employed, it is not intended to argue that it must be superior to the ordinary marine boiler in cases where more of the properties of an express boiler are required. Nevertheless, there are many cases in which it would be superior to the marine type at present at work in fast passenger services and despatch boats. When Mr. Thornycroft read a paper six years ago at the Institution of Naval Architects, describing his boiler, nearly all the superintendent engineers said that they did not think it suitable for their class of work. Since then, however, so many opportunities have arisen for employing express boilers, that boilers of this type representing some 300,000 I.H.P. have been already built. The most prominent feature in this design is the arrangement of generating and down-take tubes, ensuring a systematic circulation of water, by means of which is obtained a maximum transmission of heat, and at the same time preventing any possibility of overheating the tubes. The arrangement of these tubes in long flues and passages through which the flames must pass before reaching the uptake ensures a high evaporative duty from the boiler; at the same time these must be arranged in such a way as to allow of their being cleaned from soot and ashes. These flame passages are of such a size that with continual forcing there is no possibility of their being choked, as is so often the case with the tubes of locomotive and marine boilers. The combustion chamber formed of tubes admits of the use of air jets for intimately mixing the gases and thus ensuring more perfect combustion, making the boiler superior in economy to the ordinary marine boiler. Dry steam is ensured and priming prevented by a sufficient volume of steam space in the separator barrel. If this volume is below a certain limit it necessitates the use of reducing valves between the boiler and engine to prevent a dangerous amount of water at times being carried over to the engine. In order to allow a free expansion of the tubes and consequent freedom from leakage at the joints caused by unequal heating and rapid changes of condition, a curved form of generating tube is essential. It might appear that there would be great advantages in the use of straight generating tubes which would permit of internal examination, but it has been found by experience that they are quite incapable of withstanding the severe treatment to which water-tube boilers are generally subjected. The method employed of simply expanding the tubes into the different barrels has been found most satisfactory, it being quite possible with a suitable gearing for working the expander to do the work efficiently in a 5 in. barrel. A similar arrangement of gearing can be used for plugging or removing a damaged tube. In a case of this sort, however, it is usually unnecessary to replace the tube, as one or two out of action makes such a small reduction in the total heating surface. Steel has been found to be the most satisfactory material to use for the tubes. It was at first thought that some non-corrosive metal, such as copper or brass, would be superior, but trial has shown that brass will not stand the high temperature, and copper so soon deteriorates under these conditions. At the present time numbers of boilers are having their copper tubes replaced by steel. One great advantage in the working of water-tube boilers lies in their power to raise steam quickly, but it must be remembered that this necessitates an extreme sensitiveness with regard to their feeding. For example—one of the boilers of H.M.S. *Daring* would evaporate the whole of its water in ten minutes if the feed were altogether stopped, while a boiler of the ordinary marine type would take about a hundred minutes, so it will be seen that it is ten times as sensitive in this respect. This difficulty is got over by the use of an automatic feed regulator, which accurately keeps the water in the boiler at a constant level under different rates of working. The before-mentioned sensitiveness and freedom from priming in

**New Dry Dock.**—The construction of an immense dry dock has been commenced in the Japanese naval port of Kure. It is to be 464 ft. long, 69 ft. wide, and 42 ft. deep, and will take vessels of 15,000 tons.

this type of boiler have made it possible to increase their output with very great rapidity. On many occasions the speed of the *Boxer* and her sister vessels has been increased from 19 to 29 knots in 15 minutes, which means an increase in power from about 800 to 4,500 H.P., a performance quite impossible with the old form of boiler.

At the conclusion of the lecture, which was illustrated by diagrams, specimens of boiler pipes, and other appliances, Mr. Thornycroft exhibited a working model of the Thornycroft water-tube boiler under steam, and explained its construction and working.

The President then invited questions on the subject of the lecture, and said he was sure they all felt very much obliged to Mr. Thornycroft for the information he had afforded them. This type of boiler had been used in the torpedo-boat destroyers up to something like 5,000 H.P., and it really furnished about the only solution of the problem of getting high speed in a small boat. Mr. Thornycroft had very rightly said that he did not put forward this boiler in competition with the ordinary cylindrical boiler for general purposes, but it was adapted for high speeds where a large amount of power was required in a small space. Mr. Thornycroft had also said that this boiler was intended as an express boiler for torpedo-boat destroyers, and for despatch vessels, but there was something more in it than that, although the further development and more extended use of water-tube boilers must be the result of experience. If they were going to get the full advantage of high pressure steam they must use cylindrical construction of comparatively small diameter.

Numerous questions were then addressed to Mr. Thornycroft by Mr. Ruthven, Mr. Leslie, Mr. Sage, Mr. Johnston, Mr. M'Farlane Gray, Mr. Hawthorn, Mr. J. T. Smith and others. Mr. Thornycroft replied to these various questions at length, some of his answers being supplemented by the President, who gave the experience of the Admiralty on several points on which information was desired.

Mr. Ruthven proposed a hearty vote of thanks to Mr. Thornycroft for his lecture, and the motion, having been seconded by Mr. Sage, was carried by acclamation.

Mr. R. Leslie proposed a vote of thanks to the President for attending and taking the chair on that occasion.

The proposition was seconded and carried with cheers, and the President having briefly acknowledged the vote, the proceedings terminated.

## THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

### The Ostend Line.

SO much attention was called to the voyage of the latest addition to the fleet of Belgian mail steamers, plying between Ostend and Dover, when the *Rapide* spent a whole night at anchor off the Goodwins, that it seemed well to choose this line for the second place in our Notes on the Mail Fleets of the Narrow Seas. There is another reason why we should discuss this line in connection with the Flushing route, for both are foreign undertakings, and the Ostend line also has recently made great additions to its fleet, whilst very strongly indicating its preference for the paddle-wheel method of propulsion. The information obtainable at headquarters as to the origin of the service is again of the most meagre description. I quote all I can get: "The service was established in 1846, nearly half a century ago, being at first jointly carried on by the British Admiralty and the Belgian Government. A mail boat ran every night except Sunday, English and Belgian steamers being employed alternately.

"In 1863 the Belgian Government took the entire service into their own hands, and from that time forward it has undergone a remarkable expansion."

Now I am unfortunately of too recent date to have any personal knowledge of these matters, and there is no book that I am aware of that deals with the cross-Channel lines. But I am able to remind my readers that this date, 1863, was about the year when the London, Chatham and Dover Railway entered upon its work of carrying the mails between Dover and Calais. It seems worthy of notice that this was also the year when the Belgian Government assumed the duty of carrying the Ostend mails. Now I think that this is a point upon which informa-

tion is not given, but which will appeal to my older readers and perhaps induce them to give us completer information. Was there not a period after the Government ceased to carry the mails in Admiralty bottoms and anterior to that when the Chatham Railway and the Belgian Government assumed the duty? Was there not a time when Messrs. Churchward were the Government contractors for the sea transit, and when they built such famous and well-known vessels as the *John Penn*, and I think, the *Victoria*? In Lindsay's "Merchant Shipping" one of these two ships is mentioned, but the whole question of Dover mails is dismissed in a single page, and by far the greater part of that is given to a disquisition on the pluck of the sailors who man these steamers.

I find that the *John Penn*, which was a Churchward boat, took the Indian mail across to Calais on her maiden trip in one hour and twenty-three minutes, and I have also a note of the *Victoria*'s speed, which eclipsed even hers. The *Victoria* afterwards ran for the South-Eastern Railway on their Folkestone route.

The earliest vessel of which I can find a trace is the paddler *Queen of the Belgians*, built by Ditchburn & Mare, at Blackwall, in 1844. Her gross tonnage was only 207 tons. She had engines of 120 N.H.P. by Maudslay's, and her length was only 157 ft. Compare this little cockleshell with the latest Belgian boat, the *Rapide*.

It was in June, 1863, as I learn from the *Times* of that date, that the Government assumed the mail carriage, and for the service had built certain paddle steamers by the Cockerill Co. in Belgium. One of these may be described to show the improvement of the steamer of 1863 upon that of 1844, just described. The *Belgique* was about 269 tons gross, and her dimensions were 182 ft. long and 21 ft. beam. Another decade saw the *Parlement Belge* on the service. She was built by the same yard and exceeded 400 tons in her gross tonnage, whilst her length was 200 ft. She is credited with a speed of 16 knots, and 1,500 I.H.P. Another ten or a dozen years passed and the authorities determined to make a large concession to travellers and mails. So they built the *Prince Albert* of steel in 1886 and lengthened her in 1889. She is now a sister to *La Flandre*. The length had got to 271 ft. and the power was nearly three times that of the *Parlement Belge*, whilst the speed was 19 knots. The result of this experiment was so satisfactory that a couple of 21-knot boats were ordered from Messrs. Denny, of Dumbarton, only to be followed by a pair a knot better, one of which was built by Messrs. Denny and the other by the Société Cockerill. It will be remembered that the Belgian sister of this pair was tried on the Clyde and eclipsed the Britisher slightly in speed. I am not altogether sure, though, whether it has not been since found that this slight superiority in speed had been gained at the sacrifice of other very important considerations. Last of all, during the year 1895 came the *Rapide*, built in Belgium and of a length of 320 ft., with a trial speed of just under 21 knots.

The land connections of this line were mentioned last month, and may be left alone now. As showing the return which the public makes to those who give it facilities, I may quote the statement that since the Belgian Government took the service in hand the number of passengers has increased tenfold.

One would be apt to imagine that with the recent additions to this fleet it would be some time before any further vessels would be required. It will before then probably be seen how the new City of Dublin boats answer and the twin-screw may have attained such favour as to make the paddle even less fashionable than it now is. But even if that be not so, it seems doubtful whether any very great increase in speed is attainable for the paddle when one regards the immense weight of the wheels and the liability to injury of the floats. Taken as a whole this fleet is a wonderful contrast to the other Dover line, and we have in its development and history a striking example of how the public repays those who treat it well.

### The Isle of Man Steam Packet Co.

is the next line I wish to write about. I have received from them the fullest and most interesting information given by any line as yet, and that in spite of the fact that times have been busy with them lately, for an issue of £100,000 worth of mortgage debentures on the fleet has been offered for public subscription during the month of December. It would appear that this operation is not an addition to the capital of the concern, but merely a re-issue of expiring securities at a lower rate of interest, whereby of course a saving in charges may be effected.

### Misstatements in the Daily Press.

Our old friend the *Himalaya*, formerly the biggest merchant steamer afloat, and for many years subsequently the finest troopship in Her Majesty's service, has had a long and useful career under the White Ensign. Her design was copied for the five Indian troopers which are just following her into the oblivion of retirement. But big as she was in the early fifties, before the *Great Eastern* became an accomplished fact, the *Himalaya* is only, according to Lloyd's and the Navy list, a vessel of some 4,690 tons displacement at her load water line.

When, therefore, we read in several daily papers that the vessel will, after she has been altered by Messrs. Earle's, of Hull, and adapted for work as a coal hulk, be capable of carrying thirty thousand tons of coal, we feel that either Messrs. Earle will have to alter her so much as to make a new ship of her, or that there has been a mistake of a cipher. As she stands, three thousand tons is much nearer her capacity than thirty thousand.

One of the same papers which prints the above information also gives, in the same column, an account of several new merchant steamers ordered. In the list I saw that there were two paddle steamers ordered "by Messrs. Wallasey Ferris, on the Mersey." The firm is not a familiar one, and I looked it up in the register under Ferris without avail; but, at last, it occurred to me that there was a place called Wallasey, on the Cheshire Bank of the Mersey, which place has a ship-owning Local Board. The people who ordered the new boats were the Wallasey Local Board, and they ordered them for use in their "ferry" traffic.

### The Sunny South.

The facilities for reaching the islands of Madeira and the Canaries, are year by year increasing. And it is not surprising that it should be so. The "Fortunate Islands" are in every way a better refuge from the rigours of an English winter than is the Riviera. In the first place, the expense of living is infinitely less, or at least it certainly was so in the primitive days when I visited these islands. A visit to them was at that time an economy, whilst a journey to the south of France can never be anything but an extravagance. The overland journey, too, is an expensive and wearisome one. Everyone looks upon it as the greatest part of the price that has to be paid for the sunshine. The sea-voyage is, on the other hand, a very pleasant and health-giving part of the holiday, and one that the traveller is sorry to see finished. Then, when one gets to one's destination, the climate of the Canaries, where the mistral never blows, is a great deal better than that of the French coast. We need not, then, wonder that the voyage to these islands is popular, or that hotels are being built, and luxurious palaces taking the place of the primitive accommodation furnished to the visitor ten years ago. A great deal of the improvement here is due to the energy of the managing partner of Messrs. Elder, Dempster & Co., who first exploited the islands as a health and pleasure resort. But the firm that built the hotels and developed the inter-island communications cannot expect to retain the monopoly of carrying passengers there. Nor would such an enlightened business man probably wish to do so. For he must be aware that facilities breed traffic. So it is probable that the announcement that the North-German Lloyd Line is about to make Madeira and Las Palmas calling stations will be welcome news to every one. The North-German people have for some time run a monthly line with modern vessels of something about five thousand tons gross register to the River Plate, calling at Southampton. They have also a line of steamers sailing at four weekly intervals from Bremen direct to Brazilian ports. Their intention now is to make both these services call at Southampton, whilst the Plate Line will call at Las Palmas, and the Brazilian steamers at Madeira. Until the results of the new departure are seen, and the experiment in some degree justified, only single tickets will be issued. If the public want return tickets they must make it worth the company's while to make the service permanent.

### The Flushing Route.

*Apocryphal* of what I said last month of the origin of the Flushing route, a very kind correspondent, whose knowledge of early history in this department is unequalled, writes to tell me I was wrong in stating that the early vessels of this line were formerly blockade runners and Isle of Man boats. That Isle of Man boats were employed is admitted, but not the blockade runners. It appears that my mistake arose from the fact that the new line took over part of the fleet of an extinct

Channel Line which had owned both ex-blockade runners and boats it had built itself for its service. The Flushing Line took the latter, and had none of the former.

### Publications.

I have received a number of pamphlets from the P. & O. Co. all of which are of considerable interest. Amongst them are the Round-the-World Tours, which would tempt the most stay-at-home person to go travelling, especially as the present fares are such as would have been inconceivable to those who paid big fares for poor accommodation only a comparatively few years ago. Then there is the "Handbook for Australian Passengers" which gives views of the latest record breaker of the fleet, the *Caledonia*, as well as time tables of the various services, maps, tables, etc.

The great company of Leadenhall Street has always been proud of its development and progress—as well it may be—and it gives a very good bird's-eye view of the expansion of its material by a profile fleet, showing the appearance and rig of the various steamers it has possessed.

"P. & O. Pencillings," however, deserves more than a word of notice, though it is not quite a recent production. This is a handsome volume worthy of a place on a drawing-room table, with a series of coloured illustrations relating to the various scenes in the life at sea in a P. & O. steamer. It also gives views of some of the most important places served by the line. The interest of the pictures relating to the sea life is great to those who have been passengers by the company's ships. In spite of the humour attaching to dinner, baths and shaves in a bad sea in the Bay of Biscay, we may take it that these illustrations tend to induce those who have not been passengers to remedy the omission, for there is no doubt there is nothing like sea voyaging for rest, instruction and the amenities of social life, especially when the skipper has such a good collection of young ladies in his charge, as he seems to have had on the trip when Mr. Lloyd took these sketches and notes. It must be noted too, that all the pamphlets I have enumerated are illustrated in the capital style characteristic of the P. & O. publications.

From the American line I have received a little volume entitled "Facts for Travellers." It is published for the use of both those who use the American and Red Star lines, both of which are now the property of the International Steam Navigation Co., of Philadelphia. This volume is of a kind which, in many respects, is essentially American. The get-up is excellent. Some account of the fleet of the company is afforded, there are maps of the North-Atlantic steamer track, of the entrance to the port of New York, of the City of New York itself, of Southampton and of Europe. The railway facilities of Southampton, as well as the means of going thence by the new twin-screw steamers of the South Western Railway to France, are dwelt upon.

The traveller will, however, find almost every kind of information he may require in the appendix. I may instance that there is a cable code suitable for his wants. Tables of money of various countries, of measures of capacity, time and distance. A table of fares and time of journey to various places in Europe, as well as a large number of useful facts and much statistical information.

Another publication to hand is the White Star Calendar for the New Year. This is much on the same lines as that for 1895, save that the case is now real Russian leather. The illustrations on the various cards were, however, last year similar throughout. In the present set there are no two alike, the whole fleet being illustrated—as far as twelve pictures will do it—and several interesting surroundings are brought in. This souvenir is a thing which will be useful to others besides those who are fortunate enough to have opportunity to travel.

### Southampton.

The Great Western Railway surpassed itself in its special for the London passengers of the *Furst Bismarck* on that vessel's first call at that port. She had broken the Plymouth record, of course, and they naturally were anxious to break theirs to London, and they did. Some thirty-three passengers were sent up by this famous train, and this fact excites the vast contempt of the *Southampton Times*. They think it will not be long worth the Great Western Railway's while to go running an extra fast special for thirty-three passengers, and the inference is that any comparison between the advantages of the two ports must exclude the fast railway service from Plymouth because they allege it will not be permanent. I am not going to prophesy in this matter, nor do I think it is necessary to

hazard any opinion. It is a little amusing to see how every fact is turned to suit the case of the port of the future—perhaps it considers itself the port of the present now. Only a little while ago one read what excellent people the South-Western Railway officials and the steamship people were because they ran a special to Waterloo for ten passengers. It is thus a virtue for Southampton to put herself out for as few as ten, and a sin for Plymouth to do the same for as few as thirty-three. If this be an argument it is certain that Southampton's case is unassailable.

Talking of Southampton and the Hamburg line I see that the great steamer now building at Messrs. Harland & Wolff's for the Hamburg American Co.'s New York service is to be called the *Pennsylvania*. It will be remembered that she is to considerably exceed the *Georgic* in size, and she will carry passengers of both first and second class, though she will be chiefly a cargo boat, and of course one of very large capacity.

Mr. Fry's book on "Atlantic Steam Navigation" is dealt with elsewhere. I may, however, *apropos* of the *Georgic*, point out that he is wrong in assuming that the White Star cargo boats carry steerage; or indeed any passengers. They, of course, carry cattlemen; but these are, neither technically nor actually, passengers, for, for convenience of discipline, they are borne on the ship's books in most lines, and receive a nominal wage, so as to constitute them the servants of the shipowner.

#### White Star Line.

The Belfast strike has caused the White Star Works at Liverpool to undertake a job quite unprecedented in the annals of a Liverpool yard of this class. The New Zealand liner *Doric* had gone over to Belfast for a very big overhaul, after some fourteen years' work. Then came the strike and she was stopped. So a day or two ago the company sent a couple of tugs over for her and towed her across to Liverpool, intending to do themselves what the Belfast workmen refused to allow Messrs. Harland & Wolff to do for them.

The sensation of the month has been the collision of the outward bound mail steamer *Germanic* and the inward bound Glasgow liner *Cumbræ*, in the Crosby Channel. How the collision occurred we shall perhaps hear in due course. At all events, it is no business of ours to discuss it here. But the fact remains that it did occur as the *Germanic* was creeping out in the fog. The further important fact is also indisputable that, though darkness and fog were present to render the situation as dangerous as possible, and though the coaster sank with unfortunate (though scarcely astonishing) promptitude, not a single life was lost. This seems to say a great deal for all on board the liner. The discipline must have been perfect, and the man at the head must have been of the stuff of which so many British skippers are made. He showed something of his mettle at Spithead; but I venture to think the Crosby Channel exploit was a greater, if a less showy deed. The usual amount of rubbish was written on the occasion by the daily press. The *Cumbræ* was cited as another instance which proved "the necessity of all passenger steamers being fitted with bulkheads." As if there were any that were not. The *Cumbræ* herself had five, and that is not bad for a craft whose length is only 280 ft. From the published pictures of the *Germanic*'s injuries it is interesting to see what an iron deck means in collision. The stem of the *Germanic* was obviously strong enough—with the mass of dead-weight behind it—to push in and destroy the shell of the coaster without any injury to itself. But the *Cumbræ* had an iron deck, and that was able to inflict a resistance which the great iron stem could not withstand. It cut through the stem and then naturally went on through the plating of the liner till the two ships were at rest. To some extent the injuries to the *Germanic* are an indication of the depth to which she cut into the *Cumbræ*. It is a hard thing to realise what a ramming at full speed by a vessel built on the lines of say, H.M.S. *Polphemus*, would mean to the unhappy craft that received a full and fair blow in her midship compartments.

**Water-Tube Boilers.**—Messrs. Humphrys, Tennant & Co., of Deptford, have received orders from the Admiralty to supply six Niclausse water-tube boilers for H.M.S. *Seagull*. This is said to be due to the excellent results obtained with these boilers in the French cruiser *Friant*. Messrs. Niclausse, of Paris, have also received orders for boilers of 10,000 I.H.P. for a cruiser building in Germany for the Russian Government. The German Government have also placed an order for this boiler with Messrs. Niclausse.

## THE JOINT LANCASHIRE AND YORKSHIRE AND LONDON AND NORTH WESTERN RAILWAYS' ACCELERATED TWIN-SCREW MAIL AND EXPRESS SERVICE TO THE NORTH OF IRELAND.

WE are enabled to give our readers in this number several plate illustrations of the most recent addition to the fleet of the Joint Lancashire and Yorkshire and London and North Western Railways, whose headquarters are the North Lancashire port, Fleetwood.

The line has long carried on a regular service to Belfast, and some years ago the authorities came to the conclusion that the day of the paddle steamer in the Channel traffic was over, and that although they were possessed of a fine and modern fleet of such vessels, including the *Prince of Wales*, of which we give an illustration. The *Prince of Wales* is only nine years old at the present time. She is steel built and fitted with modern and powerful disconnecting paddle engines of the oscillating type. She was only five years at work when the directors of the two railways arrived at the conclusion to supersede her and her fellows, and we may be sure such a momentous decision, involving the sacrifice of a great deal of capital, was not reached without much consideration based upon information derived from the best possible sources. When the decision was made no time was lost in carrying it into effect. The first of their twin-screw boats, the *Duke of Clarence*, was at once put in hand by Messrs. Laird, of Birkenhead, and in April, 1892, she commenced her work.

The plate shows that this vessel is characterised by the fine lines and neat appearance which distinguishes all the vessels of this yard. Just two years later came the *Duke of York*, built at Dumbarton by Messrs. Denny & Co. Of her also we give a plate. But it was not till the advent of the *Duke of Lancaster* that the paddle steamers were entirely done away with, so completely that the last and best is now on sale. The three twin-screws which we have enumerated, being all of the same design and speed, have made the performance of the sea journey a very regular and evenly accomplished one. The distance between Fleetwood and Belfast is 110 nautical miles, and this is continually accomplished within the six hours, whilst under favourable circumstances a considerable reduction of this time may be made. The vessels leave Fleetwood at a fixed hour, and there are expresses run in connection therewith from the principal towns served by the two companies. Thus passengers can leave Euston by London and North Western special at 5.30 p.m. daily, and Manchester and Liverpool by Lancashire and Yorkshire train at 9.50 p.m. and 9.35 p.m. respectively. Thus the popular watering-place of Blackpool is brought easily within the reach of the inhabitants of Belfast, whilst the manufacturing districts of Lancashire and Yorkshire find the Giant's Causeway and the other sights of Northern Ireland almost at their doors. The joint railways have done a great deal to improve the port of Fleetwood, and are continuing to do so, by dredging the bar and fitting up the harbour, with the result that a consider-

able foreign trade is growing up, and that vessels of over 2,000 tons register are in the habit of using the port.

In proceeding to give a description of the latest addition to the fleet we may remark upon the felicity of its present nomenclature. The names of the vessels have long been taken from the members of the Royal family, and it was somewhat natural that the first of these three sisters should have been called after the Prince whose premature death occurred so recently. It was natural, too, that some reference would be desired to the owners of the line, and in the two later additions it was possible to refer to the two great northern counties which give one of the owners its

fitted with doors for convenience. These are seen clearly in the general illustration of the vessel. Above the bridge deck, which forms the promenade for first-class passengers, is a shade or boat-deck of the kind provided in recent Atlantic passenger steamers. A similar boat-deck is carried over the poop. Thus the promenade is clear of all obstructions, and the passengers are kept out of the way of the officers engaged in the navigation of the ship. On the poop is a deckhouse where the officers' accommodation is provided as well as a mail room. Below these on the main deck are the third-class passenger spaces, women and children being kept apart. The deckhouse on the bridge deck contains twelve special sleeping cabins



THE SALOON OF THE S.S. "DUKE OF LANCASTER."

designation, and, at the same time, to give a loyal compliment to the Prince who is third in succession to the Throne, in the one case, and to its beloved occupant in the other. For her Majesty, though *Queen* of England, is *Duke* of Lancaster.

The steamship *Duke of Lancaster* was built at Barrow by the Naval Construction and Armaments Co. She is, of course, constructed of steel. Her principal dimensions are:—Length, between perpendiculars, 310 ft.; beam, 37 ft.; and depth, moulded, 17 ft. 6 in. The hull is divided into compartments by eight watertight bulkheads. The vessel has practically three passenger decks, viz., the bridge, main and lower decks. The bridge deck is not continuous, there being breaks forward of the poop and aft of the forecabin for cargo purposes. These breaks have high bulwarks

which are reached from the main companion. Descending by this is reached the main dining-saloon, which we illustrate, situated forward of the engines. It contains six tables, the ship's library, and ample conveniences for serving the meals required by the most fastidious passenger. The saloon is quite on the plan of an ocean boat with a stained-glass dome, and the fireplace gives it a very cheerful appearance. This apartment is panelled in teak and satin-wood with sycamore carvings.

Aft of the saloon are, on the one side, ladies', and on the other side gentlemen's apartments. The ladies are on the port side, having a special cabin fitted with white wood and prettily decorated, and five ladies' state-rooms beyond. Aft again are the ladies' lavatories, etc. On the starboard side the gentlemen have



their state-rooms and similar conveniences to the ladies. The baths and sanitary appliances, generally, have evidently had a great deal of attention, and the fittings are not only of the most improved type but everything has been designed with a view to cleanliness and health. On the lower deck are first-class state-rooms, which are designed for two, three or four passengers each. Altogether the *Duke of Lancaster* has accommodation for some two hundred saloon passengers, whilst her total complement of all classes certified by the Board of Trade is eight hundred. The provisions of the Life-saving Appliances Act have been thoroughly carried out in the ample supply of boats and belts provided. The crew are berthed in the fore end of the ship on the main and lower decks. The vessel is lighted throughout by electricity, and the questions of ventilation and heating have been very carefully attended to, whilst the arrangement of the galley and pantry economise the work of the steward's department, and at the same time ensure that the meals shall not be served cold. The usual cargo appliances and auxiliary machinery are supplied. These include steam windlasses and capstan, and three cargo winches. The vessel is steered by Brown's patent gear, actuated by one of the firm's telemotors.

In regarding the illustrations of the engines, one is at once struck by the way in which lightness and strength have been combined in their construction. There are two sets of triple-expansion engines, having cylinders 24 in., 36 in. and 55 in. diameter, by 33 in. stroke. Steam at 160 lbs. pressure is supplied from two main boilers constructed of steel. There is also a large auxiliary boiler. The stokeholds are fitted for use with forced draught on the closed stokehold system. The vessel was submitted to thorough trials, including a trip to the Channel Islands. During these preliminary runs she attained a speed of 17.2 knots with natural draught, rising to 18.9 knots with forced draught. But she was not on these occasions put to her utmost capacity, and since she has been on the station she has exceeded 19 knots, with one inch of air pressure and 148 revolutions.

It will be seen from the foregoing account of this vessel that it is possible to make a very ordinary journey in the North with the full comforts attainable in the keenly-contested ocean trade, and it is difficult to see where competition can improve the position of the passenger by the joint service of Lancashire and Yorkshire and London and North-Western railways.

### PHOSPHOR BRONZE FOR STEAM FACES.

MR. HOUFE'S paper upon internal friction in steam cylinders, read before the Institute of Marine Engineers on October 28th, and reported *in extenso* in our issues of November and December, elicited some interesting discussion as to suitable pressures upon piston rings and upon the best means for maintaining efficient lubrication in steam cylinders and valves. It was surprising perhaps that no more information was elicited from the experienced engineers present of the relative conduct of various metals under the circumstances of sliding work under steam pressure.

No doubt the character and liberal supply of the lubricant has a great deal to do with satisfactory results, but at the same time we would submit that the relative characters of two metals in sliding friction with one another is equally important.

One of the steam surfaces in a steam cylinder may be taken as always being of cast iron, and it will be in the choice of the

character of the other metal in frictional sliding contact with it that the result as to wear and minimum of friction will depend. The metal, in our opinion, most certain to give good results, would be one as diverse as possible in structure and character from that it slides upon, and sufficiently dense and homogeneous in texture to take a smooth, shining surface without a tendency to abrade. A soft metal or one of small homogeneity or density, would not only wear quickly, but what is worse, would, by its abrasion, afford small loose particles filling the texture of the iron and tending to set up galling between the two surfaces, which could only be prevented by excessive lubrication.

We consider that such a material as phosphor bronze fulfils admirably the conditions that we have laid down as above, and it is well known that this metal has already established a splendid reputation for the minimum of wear and perfect condition of wearing faces under lengthened tests.

We are aware of cases in which slide valve faces in phosphor bronze under fairly high steam pressure of 50 lbs. have shown no perceptible wear after five years, and must evidently from the absence of wear have been working for that time under a condition of minimum internal friction, even with no better lubricant than soap and water. In stern bushes also where in contact with sandy water, which may be considered perhaps the worst possible condition, the record of this metal has been remarkable as regards cool running and easy wear.

For rings on high-pressure steam pistons, we should consider this metal to be exceptionally suited, as having the elasticity almost of steel with the kindly wearing face of the best gun-metal.

We should be glad to hear our readers' experience as to the behaviour of this or other metals in the trying positions of high-pressure piston rings or slide valves.

### A NEW AND REMARKABLE VENTILATOR FOR SHIPS.

THE Torpedo Ventilator Co. has for some time occupied a conspicuous position with their goods at exhibitions of sanitary apparatus, and amongst other honours, have recently been awarded

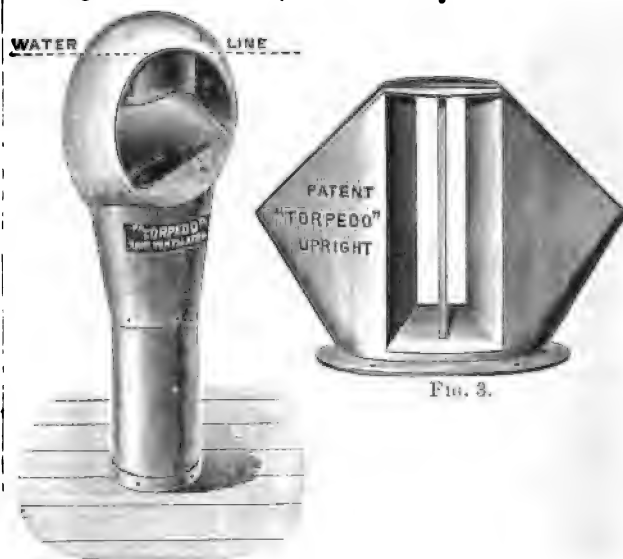


FIG. 1.

a gold medal at the Newcastle-on-Tyne Exhibition. The general features of their original patent "Torpedo" Ventilator are well known to the travelling public by the enormous number now in use on railway carriages in this and other countries, and their efficacy in exhausting vitiated air, is a fact that is made gratefully evident to all who travel in carriages so ventilated.

It was, however, a new form of ship's ventilator

which was the special feature of their exhibit at Newcastle. It has the powerful exhaust action of the well-known "Torpedo" pattern, and in addition thereto perfect protection from the ingress of water down the air-shaft from spray or wash of waves. This is effected by an ingenious method of attaching the outlet cap

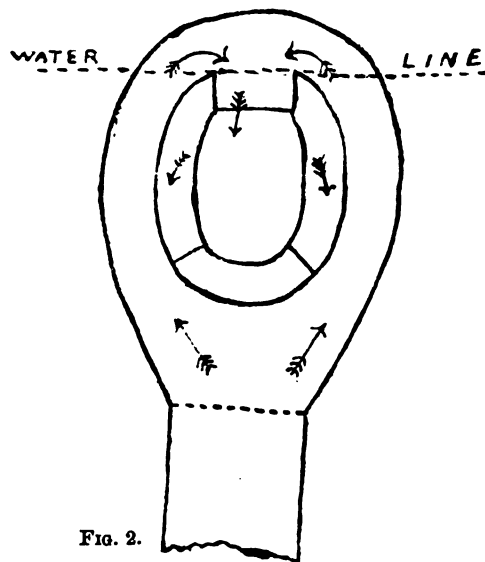


FIG. 2.

proper in an inverted position, and depending from the air-shaft, which is taken around and above the pendent cap.

We illustrate the form suitable as a deck ventilator in Fig. 1 as a perspective view, and in Fig. 2 as a diagrammatic section, showing clearly the coned induction outlet cap suspended below the hollow surrounding annulus and communicating with the annulus by the suspended neck. The induction from the outlet cap caused by the passing breeze, draws down the vitiated air through the suspending neck from the annulus, which is in communication with the deck below or the stokehold.

The outlet cap, by being thus suspended from the outer annulus, prevents any sea or spray which might wash the decks from entering the ventilator and going below.

We understand that this ventilator has proved a great success in actual use, and effects a great diminution of temperature, particularly in stokeholds.

Messrs. Thomas Irvine & Co., of Old Hall Street, Liverpool, have obtained the sole agency for this form of ventilator in Liverpool, and negotiations are proceeding for agencies in other ports. We also give an illustration, Fig. 3, of a new form of railway carriage ventilator, made of cast-iron, the invention of Mr. Mulligan, of the Torpedo Ventilator Co., 32, Eyre Street, Sheffield, which has several distinctive features of its own—notably, the absence of any detached parts. This improvement removes any possibility of damage by fracture, and has recently secured to the inventor several orders for trial samples for various railways.

We think the compact and durable form of this ventilator, in addition to its powerful exhaust action, will recommend it for adoption, and we would further recommend all who make use of automatic ventilating appliances to send for one of this firm's catalogues.

## NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondent.)

### The United States and Great Britain.

THE Message of President Cleveland to the United States Congress concerning the difficulty which exists between this country and Venezuela as to a boundary line, was the principal subject of interest towards the end of last month. The President's Message implied that under certain circumstances—which circumstances he seemed to think likely to occur, the United States Government was prepared to go to war with us. In some quarters this was taken to be a piece of electioneering bombast, but it was soon made evident that the American nation, under the impression that in some way Great Britain was violating their cherished Monroe doctrine, were prepared to support the President even to the extent indicated. Preposterous as President Cleveland's distortion of the Monroe doctrine was, for it implied the right of the United States to assume a protectorate over the whole American continent and to justify her in constituting herself the judge and dictator in all affairs connected with that continent—the temperate and statesmanlike attitude assumed by the British public in regard to the matter, contrasted most favourably with the heated feeling in the United States, though it was not long before there were signs that American opinion would assume a calmer tone.

### The United States and her Power for Offence.

It is natural that in connection with this matter the United States' power for offence should have been discussed. It has been very generally stated, and even by people who should have been better informed, that the United States Navy would speedily sweep our commerce off the seas while their army would overrun Canada. When, however, an examination of the United States forces is made it becomes evident that they could do nothing of the sort. In the first place their navy consists at the present time of less than thirty modern ships, many of which are not in home waters. On the other hand, the British Navy, even after allowing for the maintenance in the Mediterranean and on other stations of fairly large squadrons, and the placing of not less than two vessels to watch every one of the United States cruisers, still permits of a sufficient force to blockade all the harbours of the United States. The commerce that would cease to cross the seas would be American, and although a great deal of "bunkum" has been talked about bombarding American towns, we may be sure that no such strategic mistake would be made by our naval officers. As to Canada, while it is quite possible that raids could be made into British territory, and that the Canadian Pacific line could be cut, the command of the sea in the lakes would have to be fought for, and through Esquimaux and Halifax we could pour into Canada an adequate military force to hold the raiders in check. But it is exceedingly unlikely that such a criminal, suicidal, and calamitous war will happen, for no greater misfortune could overtake civilisation and in the interests of human kind it is to be hoped that peace will always reign between ourselves and our kin beyond the sea.

### Reorganisation of the Channel Squadron.

The reorganisation of the Channel Squadron, which took place the last week in December, will have the effect of rendering that force stronger than it has ever been before. The battleships *Royal Sovereign* and *Empress of India*, which were paid off at Portsmouth and Chatham respectively, were on the following day recommissioned by Captains Henderson and McLeod as additional ships on the strength of the squadron. The old crews of these vessels put into commission the new battleships *Majestic* and *Magnificent*, which thus become the flagships respectively of the Vice and Rear-Admirals of the squadron. The *Endymion* also paid off and her crew commissioned the *Blake*. We have thus constituted a squadron of six first-class battleships and two fastest first-class cruisers in the British Fleet. It is probable that early in the new year two other cruisers may be added to the strength of the squadron, and the *Fox* and *Flora* have been named as likely to be commissioned for the purpose, but it is not so necessary that the squadron should be supplied with vessels of this particular class, since there are numerous small vessels ready to hoist the pennant at a very short notice. The newly organised squadron

is to be ready for sea by the middle of January, and will then assemble at Portland preparatory for a cruise.

#### Portsmouth Dockyard.

It is very noticeable in connection with the completion of the *Majestic* at this yard that it has considerably interfered with the rate of progress of other work in hand. The *Cesar*, which seemed little advanced in building up to now, is making a start once more, and the *Prince George*, which has her armour in place already, will now receive her machinery. The *Eclipse* has had her boilers and engines, which were made in the dockyard, placed in position. The only vessels in addition to these is the cruiser *Gladiator*, the keel plates and frames of which have been put together, although the ship is not yet laid down. Of other work in hand, there is the *Melpomene*, the *Achilles*, *Neptune* and *Impérieuse* all in various stages of repair, as is the *Sultan*, which should soon be ready to pass into the Fleet Reserve. The commissioning of several new ships has also given much work in the yard, and at the same time assisted to clear away some of the men from the dépôt. The *Bacchante*, which has been here for some time, has been placed in the list of vessels for sale, and it is expected that the *Hector* will follow her shortly into that list. Tenders have been invited for converting the *Foxhound* into a coaling lighter, in the same manner as the *Forester*, which was used for the purpose a short time ago. The old-fashioned gunboats come in very useful this way. The commissioning of the torpedo-boat destroyers has also given work, and now that the Channel Squadron has left, we are looking forward to the commissioning of the *Royal Oak* and *Revenge* for the Mediterranean.

#### An Instructional Squadron for Stokers.

By a recent order, nine torpedo-boat destroyers have been commissioned in the various Channel ports for the purpose of giving a number of men in the engine-room complements to acquire practice with the water-tube boilers. To each of these flotillas a fourth boat will be added early in January, and then the small squadrons will be exercised at sea within prescribed areas. The four Portsmouth ships under the command of Capt. Tupper in the *Bozer*, will cruise between Shoreham and Torquay. The Medway flotilla will take the district eastward to Harwich, while the instructional cruise of the Devonport boats under Capt. Ricketts will be westward round the Land's End. The course of the boats will be frequently changed so as to pass as many men as possible through the course of instruction; and each flotilla being under the command of the Admiral of the port, he will direct whether the boats are to cruise singly or together. Once a year, however, the whole twelve vessels will form one squadron and exercise together, most probably this will be at the time of the annual manoeuvres. It is not to be doubted that this new movement possesses not only educational advantages but is a great security in case of emergency.

#### The Navy League.

The institution which describes itself as the Navy League is rapidly attaining a prominence in this country which it has already acquired in the colonies and will soon become a power in the land for good. Its members in the case of the executive committee appear to be thoroughly business men who have discovered and who appreciate the necessity to the empire of an all-powerful Navy. The League has recently issued an appeal pointing out that the command of the sea is the essence of our existence as a nation, and that if we lose it, in time of war half our population would be flung starving on the streets through the cessation of the inflow of the raw material necessary to their continued labour, and that if we could not win back the lost ocean dominion, we should be forced to make any terms our victors chose to impose. The League proposes to form branches in every important town in order to correct and inform public opinion, so as to insure that the elemental facts of our national environment should be brought home to every intelligent man and woman in the land. Those of our readers who are further interested in the subject should apply to the secretary for further information.

#### Chatham Dockyard.

The activity in this yard may be truthfully described as feverish. First of all the number of ships commissioned reminds one of the mobilisation. Not alone have the crews of the *Empress of India* and *Endymion* turned over to the

*Magnificent* and *Blake*, but of these ships one has just hoisted the pennant and the other will shortly do so. The *Basilisk* has also commissioned, and two torpedo-boat destroyers, the *Contest* and *Janus*. The boilers and machinery of the *Victorious* have been shipped by the contractors, Messrs. Hawthorn, Leslie & Co., and the *Illustrious* is also growing apace. Material has also been delivered for the new cruiser *Fiducieuse*, which will shortly be laid down on the slip from which the *Minerva* was launched. Repairing we have the *Lightning*, the *Monarch*, and one or two destroyers. The *Monarch* is only progressing slowly, and so far as the *Leander* and *Severn* are concerned, although both are to be taken in hand, nothing has yet been done in the way of repairs. Everything points to the fact that great energy will now be devoted to pushing on the completion of the *Victorious*, though it is a question whether she can be finished by July 1st next, the day originally fixed. With the sailing of the *Blenheim*, *Repulse*, and *Empress of India*, opportunity will be given to turn to other ships whose defects had perforce to remain in abeyance until the vessels of the Channel Squadron were completed.

#### The "Lightning" Court Martial.

When the facts of the recent collision and stranding of the torpedo-boat destroyer *Lightning*, while undergoing her steam trials on November 8th, became known, it was pretty certain that a court-martial would follow. On December 10th Staff-Commander Bullmore and Gunner Stevenson were put upon their trial in connection with the matter, the charges against the former being that he hazarded the vessel by negligence and default in connection with the collision, and that he was drunk on board her, while the charge against the gunner was, that he negligently performed the duty imposed upon him. After a trial lasting several days the charges against Gunner Stevenson were withdrawn, that officer having to go to hospital suffering from an acute attack of facial paralysis, and later on the Court found that Staff-Commander Bullmore did contribute by negligence to the stranding and hazarding of the ship, and that he had hazarded the vessel by negligence and default in connection with the collision, and that he was drunk on board the ship. The Court adjudged him therefore to forfeit five years seniority as Staff-Commander, to be dismissed from the *Pembroke*, and to be severely reprimanded.

#### The Engineers in the "Lightning."

A curious question was raised in the course of this Court Martial, prominence being given to it in the defence of Staff-Commander Bullmore. He accused the engineers of caballing to his detriment, and suggested that they interfered with the executive duties which he had to carry out. We cannot find in the evidence any support for the accusation or the suggestion. The two chief engineers who were in the *Lightning* during the trial appear to have acted very properly when they found the ship was in danger. It was due in some measure no doubt to the action of one of them that the attention of the surgeon of the ship was called to the state of the staff commander, and the other chief engineer seems to have made some very proper suggestions to the gunner who succeeded the staff commander in charge of the vessel. It would be a strange thing indeed if in such circumstances as are shown to have ruled on this occasion, officers of the experience of these two engineers did not assist in every way in their power to secure the safety of the vessel, and there can be no doubt that they were far from exceeding their duty in doing anything of the kind.

#### Devonport Dockyard.

In this establishment everything is being put on one side, as it were, in order that the *Renown* battleship from *Pembroke* may be completed and that the building of the *Arrogant* cruiser may be pushed on without delay. The *Furious*, although of exactly the same class and similar in every respect to the *Arrogant*, is being left behind, presumably that advantage may be taken of the trials of the first-named ship when ready. As to the *Renown* this vessel is being pushed on at a great rate and it is expected that she will be finished considerably in advance of the time allotted to her. Among other ships upon which work is making slow progress are the cruisers *Conquest* and *Phaeton*, the torpedo gunboat the *Spanker*, the *Talbot* cruiser and *Phaenix* and *Algerine* sloops. A large number of men have been entered recently in order to facilitate the refit of the *Phaeton*; but it does not appear that the early completion of the *Phaenix* and *Algerine* is considered so necessary as that of some other

vessels. The old *Himalaya*, dating back to the days of the Crimean campaign, has been despatched to Hull for conversion into a coal depot, but it is uncertain whether her ultimate destination is Dartmouth or Gibraltar. Very little authentic information has leaked out on the subject of next year's programme, but it is believed that it will include at least one first-class cruiser. At present Devonport can hardly hope to have a battleship allotted to her for construction. At Keyham the labour is chiefly employed on the *Phoenix* and *Algerine*, but there is a good deal of general engineering work now in hand.

#### Water-Tube Boilers.

It is the intention of the Admiralty to make a further trial of the various types of water-tube boilers with a view to establishing if possible if any one type possesses advantages over the other. The experience of the officers of the *Sharpshooter* with the Belleville boilers has been altogether satisfactory, but at the same time it is quite as well that other types should be put to similar tests. The torpedo gunboats and three torpedo boats are to be fitted by different firms with a view to these competitive trials. It is not yet stated what tubes will be chosen, but the *Spanker* is already being supplied with one set at Devonport and the *Seagull* will have a set of Niclausse boilers that Messrs. Humphreys, Tennant & Co., will supply. It is obvious that not only will it be an advantage to test these different tubes, but officers and men, artificers and stokers must all profit by the instruction and experience which they afford.

#### Work of the Last Year.

During the last year the displacement of ships of war put into water has been of greater tonnage than that of at any date previously with the exception of 1892, upwards of thirty-six vessels having been launched altogether, of which eight were put afloat in the Royal dockyards, and the remainder in private establishments. Of these vessels, five were battleships of the first class. The *Majestic* and *Prince George* at Portsmouth, the *Victorious* at Chatham, the *Jupiter* from Thomson's yard and the *Renown* at Pembroke. Two first-class cruisers were launched—the *Powerful* at Thomson's, and the *Terrible* at Barrow. The second-class cruisers were five in number—the *Minerva* at Chatham, the *Talbot* at Devonport, the *Venus* and *Diana* at Fairfield, and the *Juno* at Barrow. Devonport also put afloat two sloops, the *Phoenix* and *Algerine*. This is a very fair output for one year, including as it does the record ship-building of the *Majestic* and *Magnificent* in less than two years from laying down the keel plates.

#### Sheerness Dockyard.

Having got rid of the *Medusa*, *Medea* and *Immortalite* which have departed for their respective stations, we are now devoting all our energies at this yard to the *Pelaurus*, and no effort will be spared to comply with the wish of the authorities to have this ship ready for commission next, in fact we hope in our way by the completion of this vessel to make a record for the construction of cruisers, such as Portsmouth and Chatham have made in that of battleships with the *Majestic* and *Magnificent*. Messrs. Thomson, of Clydebank, who will supply the engines of the ship to give her a speed of twenty knots, have guaranteed that they shall be on hand in good time. The *Dragon* torpedo-boat destroyer has now been joined by the *Janus* and *Contest*, similar vessels and these three will be used for instructional purposes at this port. The *Sans Pareil* has resumed her duties here as port guardship; her refit at Chatham having been completed so that the *Landrail* will now commence her new refit. The *Cleopatra* having been paid off, is being made ready for service with the training squadron, and is to be fit to go to sea by the end of March. The *Sheldrake* and the *Speedy* have been in hand for repairs, and the *Basilisk* which called here on her way to sea, required a little to be done. The *Castor* which has been brought here from North Shields, is to be prepared as an overflow ship to the naval barracks, which are very much crowded.

#### Shipbuilding Work in Hand.

There is a good deal of work at present in hand in the public and private yards in the shape of ships not yet launched, although we may expect to see it largely augmented before the end of the year. At Portsmouth the battleship *Cæsar* should be ready for floating very early, and at Pembroke the date of the launch of the *Hannibal* battleship has been fixed for the last day of April. The *Mars* battleship, building by Messrs.

Laird's at Birkenhead, has been ready for floating out for some time, but as she is being built in a dock the ceremony has been delayed in order to advance her to a very forward stage. She will take the water in March next. The last battleship of the Spencer programme, the *Illustrious*, at Chatham, will be launched in the summer. In addition to these vessels, four first-class cruisers are building at Pembroke, Fairfield, Barrow, and Clydebank. These vessels have been only recently laid down, but should have made good progress by the end of 1896. The remaining vessels on the stocks are the second-class cruisers, *Doris*, *Dido* and *Isis*, and the third-class cruisers, *Pelorus* and *Proserpine*.

#### Pembroke Dockyard.

As at the other yards, so here, the activity may be described as phenomenal. The *Andromeda*, laid down on Monday, December 9th, has made exceptional progress, and has a great number of men at work upon her. The *Hannibal* also grows apace. Her side armour is almost entirely secured, with the exception of a part of the belt, although much remains to be done before the ship will be ready for launching, everything may be said to be in an advanced stage. It may be mentioned as unusual that many ships' fittings, which it was customary to make in the dockyard, are now supplied by contract, including such articles as watertight doors, scuttles and valves of every description. This is looked upon as an indication that the Admiralty intend to build an increased number of ships at this yard. The *Hannibal* will be ready to launch in April next, and the *Andromeda* by October or November. We have, therefore, ample accommodation for another vessel or two if it were desired.

### OBITUARY.

#### MR. E. F. WAILLES.

WE regret to announce the death of Mr. Edmund Frederick Wailles, naval architect and marine surveyor, which occurred at his residence, 13, Tankerville Terrace, Newcastle-on-Tyne, on the afternoon of Tuesday, the 17th December.

Mr. Wailles had been away from business for three weeks, but was not considered seriously ill until about ten days before his death when an attack of influenza developed alarming symptoms of malarial fever, and notwithstanding the greatest care and attention on the part of his medical advisers, who were in daily attendance, he passed away as above stated.

The funeral took place on Friday afternoon, December 20th, at Jesmond Old Cemetery, where the services were conducted by the Rev. Canon Pennfather and the Rev. W. Rudge.

Mr. Wailles as a boy served his apprenticeship in the drawing office of Messrs. Wigham Richardson & Co., Neptune Works, Walker-on-Tyne, with which firm he remained for a few years, afterwards taking the management of Messrs. Stokoe, Davidson & Co.'s shipyard, Sunderland, for a period of three years, when he was appointed manager of the ship-repairing department of the Wallsend Slipway and Engineering Co., Limited, under Mr. Boyd.

Leaving the latter company, he took the post of marine superintendent to Messrs. Bucknall & Son, of London, with whom he remained until commencing business on his own account, this he did as a naval architect and marine surveyor, in which he has been very successful, being largely consulted by the London Salvage Association, leading underwriters and shipowners.

Independent of his own consulting business, Mr. Wailles was senior partner of the firm of Wailles, Dove & Co., bitumastic enamel manufacturers, in which he took an active interest.

Mr. Wailles was a member of the North-East Coast of Engineers and Shipbuilders, Institute of Naval Architects, Institute of Marine Engineers, and the Society of Naval Architects and Marine Engineers of America, &c.

**J. Blumer & Co.**—We understand that the constitution of the firm of John Blumer & Co., shipbuilders, North Dock, Sunderland, is altered by the retirement of Mr. John Blumer, as from the 31st December, 1895. No alteration will be made in the style of the firm, the business being carried on by Colonel Robson, J.P., and Messrs. Thomas R. & William Blumer, sons of the retiring partner.

## LIST OF VESSELS LAUNCHED IN 1895.

## ENGLISH.

By OSBOURNE, GRAHAM &amp; Co., Hylton, Sunderland.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. N.
† Jupiter .. ..	Steel	Steam	British	3,398	250

By RICHARDSON, DUCK &amp; Co., Stockton-on-Tees.

Volage .. ..	Steel	Steam	British	2,724	245
Lydia .. ..	"	"	Foreign	2,724	218
Nordhvalen .. ..	"	"	"	3,291	266
Eddystone .. ..	"	"	British	2,323	218
Barge (shipped in pieces) .. ..	"	"	"	70	—
No. 451 .. ..	"	"	"	3,291	266
Leonora .. ..	"	"	Foreign	2,563	245
Pontos .. ..	"	"	"	2,731	245
Cranley .. ..	"	"	British	2,358	245
Holmfield .. ..	"	"	"	2,321	200
Rodney .. ..	"	"	"	2,458	245
Swanley .. ..	"	"	"	2,860	245

By S. P. AUSTIN &amp; SON, Wear Dockyard, Sunderland.

† Harlington ..	Steel	Steam	British	1,032	110
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By WM. PICKERSGILL &amp; SON, Southwick, Sunderland.

† Harcalo .. ..	Steel	Steam	British	2,401	200
† Acacia .. ..	"	"	"	2,401	190
† Andania .. ..	"	"	"	2,815	220

By CRAIG, TAYLOR &amp; Co., Thornaby, Stockton-on-Tees.

† Benridge .. ..	Steel	Steam	British	3,448	250
† Arkadia .. ..	"	"	Foreign	2,817	160
* Rosario .. ..	"	"	"	98	24
* Manoel Victorino .. ..	"	"	"	290	45
† Manzanillo .. ..	"	"	"	473	80

By ROBERT STEPHENSON &amp; Co., Hebburn-on-Tyne.

No name .. ..	Steel	Barge	Foreign	500	—
" .. ..	"	"	"	500	—
" .. ..	"	"	"	500	—
" .. ..	"	"	"	500	—
" .. ..	"	"	"	500	—
" .. ..	"	"	"	500	—
" .. ..	"	"	"	500	—
" .. ..	"	"	"	500	—
" .. ..	"	"	"	500	—
" .. ..	"	"	"	500	—

By SHORT BROS., Sunderland.

† Col. J. T. North ..	Steel	Steam	British	2,835	260
† Kurdistan .. ..	"	"	"	3,036	300
† Cairnloch .. ..	"	"	"	1,546	158
† Avery Hill .. ..	"	"	"	3,142	300
† Robert Adamson ..	"	"	"	2,992	250
† King David .. ..	"	"	"	2,555	200
† Lavinia Westoll ..	"	"	"	3,151	310

By JOHN JONES &amp; SONS, Brunswick Dock, Liverpool.

Caisson .. ..	Steel	—	British	1,500	—
Caisson .. ..	"	—	"	1,500	—
† Coasteira .. ..	"	Steam	Foreign	450	640
† Pensader .. ..	"	"	"	160	250
Barge .. ..	"	Sail	"	20	—
" .. ..	"	"	"	20	—
" .. ..	"	"	"	19	—
" .. ..	Composite	"	"	19	—
" .. ..	"	"	"	19	—
* Abomey .. ..	Steel	Steam	"	240	200
Barge .. ..	Composite	Sail	"	22	—
" .. ..	"	"	"	22	—
† Imerina .. ..	Steel	Steam	"	50	50
Barge .. ..	"	Sail	"	100	—
" .. ..	"	"	"	80	—
" .. ..	"	"	"	60	—
† Marcel .. ..	"	Steam	"	100	130
† Andrée .. ..	"	"	"	100	130

\* Compound.

† Triple.

‡ High Pressure.

By EDWARDS BROS., North Shields.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. N.
No. 498 .. ..	Iron	Steam	British	124	196
" 499 .. ..	"	"	"	150	320
" 501 .. ..	Steel	Twin Screw	Foreign	437	300
" 502 .. ..	Iron	Steam	British	146	260
" 503 .. ..	"	"	"	151	320
" 504 .. ..	"	"	"	151	320
" 505 .. ..	"	"	"	153	320
" 506 .. ..	"	"	"	153	320
" 507 .. ..	"	Hop'r Barge	"	145	—
" 508 .. ..	"	"	"	145	—
" 509 .. ..	"	"	"	145	—
" 510 .. ..	"	"	"	145	—
" 511 .. ..	"	Twin Screw	Foreign	527	320
" 512 .. ..	"	Steam	British	152	320
" 513 .. ..	"	"	"	152	320

By BARTRAM &amp; SONS, South Dock, Sunderland.

† Durango .. ..	Steel	Steam	British	3,008	360
† Titania .. ..	"	"	"	3,430	350

By T. R. OSWALD, Milford Haven.

* Trawler .. ..	Steel	Steam	British	163	45
Seamew .. ..	Part Iron	Screw	—	—	—

By WM. HARKES &amp; SON, East Slipway, Middlesboro.

Charles Gaselee ..	Steel & Iron	Sail	British	500	—
George Gush .. ..	"	"	"	500	—

The above were very large Hopper Barges built on account of London owners.

Besides the above a large amount of repair work has been put through their hands.

By IRVINE &amp; Co., West Hartlepool.

† IbeX .. ..	Steel	Steam	British	2,397	217
† Fulham .. ..	Steel	Tow ing Barge	for T hames River	—	—
Finsbury .. ..	"	"	"	"	"

By J. PRIESTMAN &amp; Co., Southwick, Sunderland.

† Charterhouse ..	Steel	Steam	British	3,020	280
† Deike Rickmers ..	"	"	Foreign	3,590	290

By R. &amp; H. GREEN, LTD., Blackwall.

Duchess of York ..	Steel	Pad'le	British	999	684
Bosphorus No. 45 ..	"	"	Foreign	244	126
" No. 46 .. ..	"	"	"	244	126

Barge to carry 90 tons.

By W. H. POTTER &amp; SONS, Queen's Dock, Liverpool.

Barge A .. ..	Steel	To be British	207	—
" B .. ..	"	towed	207	—

By FURNESS, WITTH &amp; Co., LTD., West Hartlepool.

† Ras Rowa .. ..	Steel	Steam	British	2,840	285
† Verbena .. ..	"	"	"	2,864	224
† Arion .. ..	"	"	"	2,838	220
† Fernfield .. ..	"	"	"	3,142	300
† Lady Furness ..	"	"	"	3,158	300
† Vasco .. ..	"	"	"	1,914	205
† Ras Elba .. ..	"	"	"	2,735	240
† Mobile .. ..	"	"	"	3,290	300
† Grantor .. ..	"	"	"	2,925	250

By HENRY SCARR, Beverley.

* Stanley .. ..	Steel	Steam	—	—	—
Aureola .. ..	Iron	Sail	—	—	—
* Quenast .. ..	Steel	Steam	—	—	—
Lily .. ..	"	Sail	—	—	—
* Ada .. ..	"	Steam	—	—	—

By W. H. LEAN, Falmouth.

Agnes May .. ..	Wood	Sail	British	101.78	—
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By H. FELLOWS &amp; SONS, Yarmouth.

Justice .. ..	Wood	Sail	British	90	—
Uranus .. ..	Steel	"	"	28	—
Vega .. ..	"	"	"	28	—

\* Compound.

† Triple.

‡ High Pressure.



## By R. CRAGGS &amp; SONS, Middlesbro' and Stockton-on-Tees.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. N.
Barge .. ..	Steel	Towg.	British	260	—
" .. ..	"	"	"	260	—
† Channel Queen ..	"	Steam	"	385.5	80
† Dolphin .. ..	"	"	"	114.69	80

## By SOUTH HYLTON SHIPBUILDING AND REPAIRING CO., Sunderland.

* Seaforth .. ..	Steel	Steam	British	191	38
* No. 14 .. ..	"	"	"	175	30

## By ALLSUP &amp; CO., LTD., Caledonian Foundry, Preston.

* Countess of Morley	Steel	Steam	British	62.05	22
† No. 157 .. ..	"	"	"	120	65

## By W. THOMAS &amp; SONS, Amlwch Port.

Celtic .. ..	Iron	Sail	British	226	—
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## By J. T. ELTRINGHAM &amp; CO., Stone Quay, South Shields.

Wm. Stephenson	Iron	Steam	British	129	40
* Charles Galloway	"	"	"	127	72
* Eva .. ..	Steel	"	"	3.3	18
* Hilda .. ..	"	"	"	33	18
† No. 172 Ship ..	"	"	"	abt. 80	45

## By GEO. &amp; THOS. SMITH, Rye, Sussex.

Nipper .. ..	Wood	Hop'r Barge	British	Carry 70 t'ns	not regd
Victress .. ..	"	Sail	"	34.81	—
Minerva .. ..	"	"	"	35.76	—
Venus .. ..	"	"	"	37.29	—

## By CHAS. HANSEN &amp; SONS, West Cowes, Isle of Wight.

Rhoda .. ..	{ St'l Frame Sail	British	15.74	—
Hester .. ..	{ W'd Plank Yacht	"	48.73	—

## By JOSEPH SCARR, Beverley.

No. 76 .. ..	Iron	Tow'g barge	British	145	—
" 77 .. ..	"	"	"	145	—
" 78 .. ..	"	"	"	180	—
" 79 .. ..	"	"	"	180	—
Gipsy .. ..	"	"	"	235	—
Alice .. ..	Steel	"	"	250	—
Kitty .. ..	"	"	"	250	—
No. 84 .. ..	Iron	"	"	250	—
" 85 .. ..	"	"	"	250	—

## By EDWIN CLARK &amp; CO., Brimscombe, Stroud, Gloucester.

Stella .. ..	Wood	Oil L'nch	Foreign	7	5
Truant .. ..	Steel	Oil	"	3	6
* Danhrall .. ..	"	Steam	"	9	8
* Kenia .. ..	Sectional steel	"	"	5	5
* Ruwenzori .. ..	"	"	"	5.8	5
* Phillis .. ..	Steel	"	British	2	2

## By SIDNEY J. DEWDNEY, Brixham.

Æolus .. ..	Wood	St & sl	British	65	—
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## By WILLOUGHBY BROS., Plymouth.

* Princess May ..	Steel	Steam	British	40	14
* Forth .. ..	"	"	"	60	25
* Sir Robert Hay ..	"	"	"	160	55

## By JAMES LAING, Deptford Yard, Sunderland.

Tampico .. ..	Steel	Steam	British	2968.10	360
Michelangelo ..	"	"	Foreign	2498.45	220
Obra .. ..	"	"	British	5456.08	450
General Havelock	"	"	"	827.09	200
Tobasco .. ..	"	"	"	2986.89	360
Drumelzier .. ..	"	"	"	3624.53	300
Clydesdale .. ..	"	"	"	3565.24	400

## By CAMPER &amp; NICHOLSON, Gosport.

* Molly .. ..	Wood	Steam	British	26	12
* No. 105 .. ..	"	"	"	130	45
* Avel .. ..	"	Sail	Foreign	35	—

\* Compound.    + Triple.    † High Pressure.

## By JOSEPH L. THOMPSON &amp; SONS, LTD., North Sands, Sunderland.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. N.
† Vega .. ..	—	Steam	Foreign	1,172	350
† Coysa .. ..	—	"	British	3,040	230
† Harpalus .. ..	—	"	"	1,445	180
† Pacific .. ..	—	"	"	2,919	250
† Skinningrove ..	—	"	"	516	60
† St. Denis .. ..	—	"	"	484	95
† North Sands ..	—	"	"	3,526	300
† St. George .. ..	—	"	"	484	95
† Pinners Point ..	—	"	"	3,921	500
† Cento .. ..	—	"	"	2,239	170
† Telde .. ..	—	"	"	1,490	180
† Shirley .. ..	—	"	"	2,922	300
† Ness .. ..	—	"	"	3,104	300

## By WM. DOXFORD &amp; SONS, LTD., Pallion, Sunderland.

† Hopedale .. ..	Steel	Steam	British	1,746	158
† Forest Abbev ..	"	"	"	1,770	181
† Turret Crown ..	"	"	"	1,827	186
† Turret Cape ..	"	"	"	1,827	186
* Turrethill .. ..	"	"	"	691	88
* Scottish Hero ..	"	"	"	2,202	285
† Oak Branch .. ..	"	"	"	3,258	289
† Diciembre .. ..	"	"	Foreign	3,258	239
† Elm Branch .. ..	"	"	British	3,258	239
† H.M.S. Haughty ..	"	"	"	231	displacement.
† H.M.S. Hardy ..	"	"	"	231	"
† Mountain Ash ..	"	"	"	—	181

<sup>1</sup> Ship built by Swan & Hunter, Ltd.

## By EDWARD &amp; CO., Millwall.

† Tampico .. ..	Steel	Steam	Foreign	15.04	6
* Paraguassu .. ..	"	"	"	44.40	40
† Dredger, No. 323	"	"	British	24.03	10
Queen Elizabeth ..	"	"	"	138.04	25
† 3 Dredgers .. ..	"	"	"	26.16	ea 10ea
† 12 Hopper Barges	"	"	"	30ea.	—
* 6 Tug Boats .. ..	"	"	Foreign	16.45	ea 16ea
* Steamer No. 347 ..	"	"	"	20	30
* Diarbeah .. ..	"	"	"	60	30
* Hercules .. ..	"	"	"	25	20
† Dredger No. 350 ..	"	"	British	24.03	10
† 4 Hopper Barges	"	"	"	25ea.	—

## By RUTHERFORD &amp; CO., Birkenhead.

Newton .. ..	Steel	—	British	36.5	—
Serodio .. ..	"	—	"	36.5	—
No. 900 .. ..	Wood	Sail	"	14.2	—
" 922 .. ..	"	Steam	Foreign	4.1	4
" 905 .. ..	"	Oil Motor	British	3	3
Bobo .. ..	"	Sail	"	3.3	3
No. 923 .. ..	"	"	"	1.6	—
5 Lifeboats .. ..	"	"	"	—	—
3 Cutters .. ..	"	"	"	—	—
3 Whale Gigs .. ..	"	"	"	—	—
3 Gigs .. ..	"	"	"	—	—
1 Dinghy .. ..	"	"	"	—	—
7 Surf Boats .. ..	"	"	"	—	—
2 " .. ..	"	"	Foreign	—	—

## By JOHN BLUMER &amp; CO., North Dock Shipbuilding Yard, Sunderland.

Duchess of York ..	Steel	Steam	British	2,580	200
Tyr .. ..	"	"	Foreign	2,256	180

## By W. WHITE &amp; SONS, West Cowes, I.W.

* Perlona .. ..	Composite	Steam	British	54	18
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By THOMAS TURNBULL & SON, Whitehall Dockyard, Whitby.

† Penelope .. ..	Steel	Steam	British	2,746	286
† Eddie .. ..	"	"	"	2,652	224

## By STRAND SHIPWAY CO.

Lightship .. ..	—	—	—	500	—
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## By COTTINGHAM BROS., Goole.

Diligent .. ..	Wood	Sail	British	120	—
William and Jane ..	"	"	"	120	—

\* Compound.    † Triple.    ‡ High Pressure.    α Quadruple.

## By SIR RAYLTON DIXON &amp; Co., Middlesbrough-on-Tees.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
Mogul .. ..	Steel	Steam	British	3,654	2,000
Afridi .. ..	"	"	"	3,648	2,000
Ockenfels ..	"	"	Foreign	3,628	1,750
Cavour .. ..	"	"	British	4,920	3,500
Rauma .. ..	"	"	Foreign	3,028	1,350
Glenroy .. ..	"	"	British	187	250
On Sang .. ..	"	"	"	2,502	1,250
Guillermo Lopez	"	"	Foreign	274	750
Ilaro .. ..	"	"	British	2,799	1,250
Sui Sang .. ..	"	"	"	2,840	1,250

## By JOHN READHEAD &amp; SONS, West Docks, South Shields.

† Murcia .. ..	Steel	Steam	British	2,644	1,450
† Poseidon .. ..	"	"	Foreign	2,593	1,450
† Travethoe ..	"	"	British	2,097	1,074
† Trevarrack ..	"	"	"	2,098	1,074
† Saba .. ..	"	"	"	2,504	1,600
† Olaf Kyrre ..	"	"	Foreign	3,092	1,500
† Adra .. ..	"	"	British	2,797	1,450
† Cayo Blanco ..	"	"	"	2,588	1,550
† Hovding .. ..	"	"	Foreign	2,088	1,100
† No. 312 .. ..	"	"	British	2,439	1,350

## By LAIRD BROS., Birkenhead.

* Salvador Correa ..	Steel	Steam	Foreign	240	480
* Queen of the North	"	"	British	600	1,700
† Not named .. ..	"	"	Foreign	111	50
† Quail .. ..	"	"	British	320	6,000
† Sparrowhawk ..	"	"	"	320	6,000
† Thrasher .. ..	"	"	"	320	6,000
† Virago .. ..	"	"	"	320	6,000

## By ROBT. THOMPSON &amp; SONS, Sunderland.

† Vagliano .. ..	Steel	Steam	Foreign	2715.78	1,350
* Ralph .. ..	"	"	British	184.11	175
† Baltazan .. ..	"	"	"	3298	1,750

## By WOOD, SKINNER &amp; Co., Bill Quay, Newcastle-on-Tyne.

† Sliedrecht .. ..	Steel	Steam	Foreign	2,019	1,200
† Bamburgh .. ..	"	"	British	646	550
† Northumberland ..	Iron	"	"	230	300
* Rose .. ..	"	"	"	96	200

## By WILLIAM DOBSON &amp; Co., Low Walker, Newcastle-on-Tyne.

† Port Hunter .. ..	Steel	Steam	British	3,552	1,650
† Prompt .. ..	"	"	"	135	175
† Burnoul .. ..	"	"	"	135	175
* Julia .. ..	"	"	Foreign	66	125
† Grand Duchess Xenia	"	"	"	800	950
† Alchymist .. ..	"	"	British	382	400
† Queen Olga Constantine	"	"	Foreign	800	950
† Bells .. ..	"	"	British	2,300	1,200
* Minister Witte ..	"	"	Foreign	270	800

## By BLYTH SHIPBUILDING CO., LTD., Blyth.

† Lombard .. ..	Steel	Steam	British	2,580	1,290
* Hanbury .. ..	"	"	"	490	400

## By EARLES' SHIPBUILDING &amp; ENGINEERING CO., LTD., Hull.

† Ivy .. ..	Composite	Steam	British	870	1,150
† Corea .. ..	Steel	"	"	776	1,165
† Hero .. ..	"	"	"	760	1,463
† Suffolk .. ..	"	"	"	245	750
† No. 396 .. ..	"	"	Foreign	960	1,500
† Robin .. ..	"	"	British	135	320
† Wren .. ..	"	"	"	135	320
* Rajah .. ..	"	"	"	57	340
† Magnetic .. ..	"	"	"	135	320
† Nomadic .. ..	"	"	"	135	320
† Redcap .. ..	"	"	"	135	320
* Ohio, reconstructed	Iron	"	"	3,967	1,660
Also Machinery for—					
* Goole Tug, No. 11	—	"	"	—	250
† Ursula .. ..	—	"	"	—	350
† Undaunted .. ..	—	"	"	—	350
† Arcadia .. ..	—	"	"	—	600
† Manila .. ..	—	"	"	—	600

\* Compound. † Triple. ‡ High Pressure. a Quadruple.

## SUNDERLAND SHIPBUILDING CO., Sunderland.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
† Cleves .. ..	Steel	Steam	Foreign	639	560

## By TYNE IRON SHIPBUILDING CO., LTD., Willington Quay-on-Tyne.

† Noviembre .. ..	Steel	Steam	Spanish	3,520	1,530
† Auréole .. ..	"	"	British	3,975	2,100
† W. D. Cruddas ..	"	"	"	2,618	1,400

## By R. WILLIAMSON &amp; SON, Workington, Cumberland.

Iranian .. ..	Steel	Sail	British	2,958	—
* Cantabrico .. ..	"	Steam	Foreign	390	400
2 Lighters .. ..	"	"	"	900	—
2 Lighters .. ..	"	"	"	200	—
1 Lighter .. ..	"	"	"	90	—
2 Lighters .. ..	"	"	"	160	—
2 Hopper barges ..	"	"	British	120	—
1 Lighter .. ..	"	"	"	290	—

## By COCHRANE &amp; COOPER, Grove Hill, Beverley.

Jersey .. ..	Iron	St. Tr.	British	138	180
Premier .. ..	"	"	"	180	320
Emperor .. ..	"	"	"	129	240
Monarch .. ..	"	"	"	129	240
Baron de neve de Roden	"	"	Foreign	152	320
Orontes .. ..	"	"	British	177	420
Beechwood .. ..	"	"	"	128	180
Falcon .. ..	"	"	"	153	320
Ursula .. ..	"	"	"	141	270
Undaunted .. ..	"	"	"	141	270
Rheno .. ..	"	"	"	119	240
Wales .. ..	"	"	"	138	180
Campania .. ..	"	"	"	167	420
Sir Edward Watkin	"	Water bt.	"	80	12
Newfoundland ..	"	St. Tr.	"	139	180
Ontario .. ..	"	"	"	139	180
Bermuda .. ..	"	"	"	139	180
Vancouver .. ..	"	"	"	139	180
Emu .. ..	"	"	"	153	320
Oakwood .. ..	"	"	"	128	180
Merlin .. ..	"	"	"	135	240
Condor .. ..	"	"	"	185	240
Umyoro .. ..	"	"	"	180	320
Admiral .. ..	"	"	"	180	320
Mayo .. ..	"	Water bt.	"	50	15

## By SIMPSON, STRICKLAND &amp; Co., Dartmouth.

* .. ..	Wood	Steam	Foreign	10	25
a .. ..	"	"	"	12	60
† .. ..	"	"	"	7	50
† .. ..	"	"	"	5	6
a .. ..	Steel	"	"	6	15
a Amaranth .. ..	Wood	"	British	9	33
* .. ..	"	"	"	8	60
a Varuna .. ..	Steel	"	"	8	15
a .. ..	Wood	"	"	32	90
a 12 Launches	"	"	"	—	—

## By RENNOLDSON &amp; SON, South Shields.

† Warrior .. ..	Iron	Steam	British	190	455
† Flying Coot .. ..	"	"	"	215	580
† Danal .. ..	Steel	"	Russian	105	291
† Dilwara .. ..	"	"	British	149	455
† Champion .. ..	"	"	"	307	950
Collingwood .. ..	Iron	"	"	68	96
Annie .. ..	Steel	Sail	"	197	—
* Tagawrog .. ..	Engines only		—	—	150
* St. Tudwal .. ..			—	—	178
† St. Denis .. ..			—	—	625
† St. George .. ..			—	—	625

In addition to the above new work, extensive alterations were made in the engines of the s.s. Laju and s.s. Beryl, each ship having new cylinders fitted on the compound high-pressure system.

## By JAMES HARLAND &amp; Co., Tranmere.

Merlin .. ..	Steel	Steam	British	260	170
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\* Compound. † Triple. ‡ High Pressure. a Quadruple.

## By C. S. SWAN &amp; HUNTER, LTD., Wallsend-on-Tyne.

Name of Vessel.	Built of	Class.	Owners.	G.T. Regis.	H.P. I.
† Saint Cuthbert ..	Steel	Steam	British	4,545	2,500
† Forest Brook ..	"	"	"	2,689	1,200
† Westmeath ..	"	"	"	6,851	3,000
† Hanseat ..	"	"	Foreign	3,371	1,480
† St. Tudwal ..	"	"	British	204	200
† Phryné ..	"	"	Foreign	2,808	1,400
† Mountain Ash ..	"	"	British	1,790	1,000
† No. 203 ..	"	"	"	3,970	2,000

By PALMER'S SHIPBUILDING AND IRON CO., LTD.,  
Jarrow-on-Tyne.

Borneo ..	—	Steam	British	4,573	2,400
Throstlegarth ..	—	"	"	1,565	1,000
Bangarth ..	—	"	"	1,565	1,000
Amana ..	—	"	"	3,411	1,700
Bedouin ..	—	"	"	3,533	1,650
Haddon Hall ..	—	"	"	4,177	2,200
Hardwick Hall ..	—	"	"	4,177	2,200
Anapa ..	—	"	"	3,524	1,700
H.M.S. Janus ..	—	"	"	805	4,000
" Lightning ..	—	"	"	305	4,000
" Porcupine ..	—	"	"	305	4,000

## By R. &amp; W. HAWTHORN, LESLIE &amp; CO., LTD., Newcastle-on-Tyne.

Kincora ..	—	Steam	British	945	1,000
Rakais ..	—	"	"	5,629	3,000
H.M.S. Sunfish ..	—	"	"	298	4,000
" Opossum ..	—	"	"	298	4,000
" Ranger ..	—	"	"	298	4,000
Czarevitch George ..	—	"	Foreign	3,000	2,400
Grand Duchess Xenia ..	—	"	"	3,000	2,400
Kherson ..	—	"	"	6,500	12,500
H.M.S. Victorious ..	} Engines only	British	—	—	12,000
Buluwayo ..					

## By ROPNER &amp; SON, Stockton-on-Tees.

† Isle of Kent ..	Steel	Steam	British	3,038	1,200
† Carperby ..	"	"	"	2,104	900
† Hawnby ..	"	"	"	2,186	900
† Selby ..	"	"	"	2,137	900
† Tiger ..	"	"	Foreign	3,270	1,320
† Granby ..	"	"	British	1,891	780
† Blaamanden ..	"	"	Foreign	3,229	1,320
† Eidsvold ..	"	"	"	3,535	1,320
† Florida ..	"	"	"	3,537	1,320
† Urd ..	"	"	"	3,103	1,200
† Dunottar ..	"	"	British	3,515	1,380
† Nordkyn ..	"	"	Foreign	3,244	1,320
† Barlby ..	"	"	British	2,489	1,080
† Wolviston ..	"	"	"	2,565	1,080
† Eastlands ..	"	"	"	2,450	1,020
† Chiswick ..	"	"	"	2,100	900
† Richmond ..	"	"	"	2,100	900

By NAVAL CONSTRUCTION AND ARMAMENTS CO., LTD.,  
Barrow-in-Furness.

H.M.S. Starfish ..	Steel	Steam	British	270	4,500
" Skate ..	"	"	"	270	4,500
" Powerful ..	"	"	"	14,500	25,000
" Juno ..	"	"	"	5,600	9,800
Burns ..	"	"	"	1,020	1,200
No. 2, Dredger ..	—	"	"	54	50
Duke of Lancaster ..	Steel	"	"	1,546	5,600
G. B. Crow ..	"	"	"	2,384	2,000
H.M.S. Majestic ..	"	"	"	—	12,000

(Machinery only)

By WIGHAM RICHARDSON & CO., Neptune Works, near  
Newcastle-on-Tyne.

Hemmre ..	Steel	Steam	—	1,345	3,800
Hathor ..	"	"	Foreign	3,692	1,600
Grenadier ..	"	"	British	1,004	1,300
Lestris ..	"	"	"	1,300	1,000
Goldenfels ..	"	"	Foreign	3,632	1,400
Sonnenburg ..	"	"	—	2,620	1,200
Jokai ..	—	—	—	—	600

\* Compound.

† Triple.

‡ High Pressure.

## By WM. GRAY &amp; CO., LTD., West Hartlepool.

Name of Vessel.	Built of	Class.	Owners.	G.T. Regis.	H.P. I.
Maling ..	Steel	Steam	British	3,075	1,500
Haslingden ..	"	"	"	1,934	1,000
Rocio ..	"	"	"	1,282	800
Rossall ..	"	"	"	2,789	1,800
Romodalen ..	"	"	"	2,547	1,250
Parklands ..	"	"	"	2,520	1,300
Elfie ..	"	"	"	1,927	900
Middleton ..	"	"	"	2,506	1,300
Mathilda ..	"	"	Foreign	3,480	1,500
Pectan ..	"	"	British	4,777	2,500
Telena ..	"	"	"	4,777	2,500
Majestic ..	"	"	"	2,586	1,300
Argo ..	"	"	"	3,071	1,500
Aries ..	"	"	"	3,071	1,500
Saint Ronald ..	"	"	"	3,079	1,500
Marie Elsie ..	"	"	"	2,606	1,300
Kirkstall ..	"	"	"	1,831	900
Firby ..	"	"	"	2,417	1,250
Nanette ..	"	"	"	2,417	1,250
Penarth ..	"	"	"	3,071	1,500
Bertholey ..	"	"	"	2,350	1,250
Ardia ..	"	"	"	2,417	1,250
Holgate ..	"	"	"	2,606	1,300

By SIR W. G. ARMSTRONG, MITCHELL & CO., LTD.,  
Newcastle-on-Tyne.

Le Coq ..	Steel	Steam	British	3,899	1,800
Buenos Aires ..	"	"	Foreign	4,680	17,000
Dorothea Rickmers ..	"	"	"	3,846	1,700
Swordfish ..	"	"	British	297	4,000
Spitfire ..	"	"	"	297	4,000
Buluwayo ..	"	"	"	4,412	3,500
Titan ..	"	"	"	500	250
Phoebe ..	"	"	"	112	260
Saratovski Ledokol ..	"	"	Foreign	569	1,400
Saratovskia Pereprava ..	"	"	"	1,417	1,400
Nerite ..	"	"	British	4,893	2,300
Cowrie ..	"	"	"	4,893	2,300
Tug ..	"	"	Foreign	236	550
3 Barges ..	"	"	"	1,184	—

## By FORRESTER &amp; SON, Wyvenhoe, Essex, and Limehouse.

* F. W. Burrowes ..	Steel	Steam	British	33	145
Whale Boat ..	"	Sail	Foreign	1-5	—
Meenie ..	Wood	"	British	2-3	—
Olive ..	Steel	"	"	14	—
Queenie ..	"	"	"	14	—
* Launch ..	Wood	Steam	"	2	6
* Pyefleet ..	Steel	"	"	24-3	95
Paladin ..	Wood	"	"	1	1
* Sea Maid ..	"	"	"	1-5	6
Polly ..	Steel	Sail	"	6	—
Sally ..	"	"	"	6	—
Wivern ..	Wood	"	"	2-5	—
* Ettie ..	Steel	Steam	"	16	79
* Edith ..	Wood	"	"	4-5	10
* 6 Vessels ..	Steel	"	Foreign	33-5 ea	127 ea
No. 239 ..	"	"	British	6-4	—
23 Boats ..	Wood	Sail	"	1-4 ea	—
No. 122 B ..	"	"	Foreign	1-4	—
No. 123 B ..	"	"	"	1-4	—
8 Dinghys ..	"	"	"	—	—

## Built at Norway Yard, Limehouse.

Ballycotton Lifeboat ..	Wood	Sail	British	7-2	—
Castletown ..	"	"	"	6	—
Odeasa ..	"	"	Foreign	4-2	—
Anchor Boat ..	"	"	British	5-4	—
Rowing Boat ..	"	"	"	3-6	—
2 ..	"	"	"	2-5	—
3 ..	"	"	"	1-4	—
Cutter ..	"	Sail	"	1	—
2 Dabchecks ..	"	"	"	1-4	—
Gem ..	"	"	"	1-4	—
2 Cutters ..	"	"	"	1-5 ea	—

38 Boats, viz., Ship Lifeboats, Gigs, Dinghys, etc.

\* Compound.

† Triple.

By COOK, WELTON &amp; GEMMELL, South Bridge Road, Hull.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. I.
Guernsey ..	Iron	Steam	British	137-56	200
Alderney ..	"	"	"	137-56	200
Albatross ..	"	"	"	150-87	310
Penguin ..	"	"	"	150-87	310
H.M.S. Osprey ..	Steel	"	"	153-00	800
Portia ..	Iron	"	"	177-93	370
Curlew ..	"	"	"	133-68	240
Valeria ..	"	"	"	148-75	310
Argonaut ..	"	"	"	148-75	310
Penelope ..	"	"	"	148-75	310
Ariadne ..	"	"	"	148-75	310
H.M.S. Sir Redvers Buller ..	Steel	"	"	270-00	430
Pelican ..	"	"	"	156-33	345
Marguerite ..	"	"	"	151-21	310
City of Gloucester ..	"	"	"	151-53	310
Jackdaw ..	"	"	"	150-31	310
Arcadia ..	"	"	"	179-85	600
Manila ..	"	"	"	179-85	600
Crystal ..	Iron	"	"	149-00	310
Topaz ..	"	"	"	149-00	310
No. 153 ..	"	"	"	118-67	300
Galtee ..	"	"	"	565	400
Canada ..	"	"	"	231	310

Marine Engines built by PALMER'S HILL ENGINE WORKS, Sunderland.

No.	Name of Steamer.	I.H.P.
438 ..	Pacific ..	1,340
439 ..	North Sands ..	1,575
442 ..	Titania ..	1,500
444 ..	Pinnars Point ..	1,830
448 ..	Braemar ..	1,750
449 ..	Vega ..	1,500
450 ..	Coya ..	1,600
451 ..	Vagliano ..	1,325
452 ..	Skinningrove ..	375
453 ..	" ..	1,575
454 ..	Cento ..	1,000
455 ..	" ..	1,580
456 ..	Telde ..	1,100
457 ..	" ..	2,200
458 ..	Ness ..	1,350
459 ..	" ..	1,800
Total I.H.P., 1895 ..		23,400
Total I.H.P., 1894 ..		20,025

By YARROW &amp; Co., Poplar.

Two first-class torpedo boats, of steel, 142 ft. long, by 14 ft. beam; triple-expansion engines; speed, 23½ knots. Home service.

One first-class torpedo boat, of steel, 140 ft. long by 14 ft. 3 in.; quadruple-expansion engines; speed, 23½ knots. Home service.

One fast torpedo-boat destroyer, of steel; twin-screw triple-expansion engines; speed, 30 knots. Russian Government.

Two Yarrow's patent water-tube boilers. Foreign service.

One second-class torpedo boat (steel), 60 ft. long by 9 ft. 3 in. beam; speed, 20 knots. Foreign service.

One wooden tug-boat, 40 ft. long by 9 ft. beam; single engine. Foreign service.

One stern-wheel steamer (steel), 86 ft. long by 20 ft. beam; draft, 16 in.; speed, 10 miles. Foreign service.

One first-class torpedo boat (steel), 147 ft. 6 in. long by 14 ft. 9 in.; triple-expansion engines; speed, 24 knots. Foreign service.

One stern-wheel steamer (steel), 70 ft. over all by 14 ft. beam; triple-expansion engines; speed, 10 miles. Foreign service.

One stern-wheel steamer. Foreign service.

One stern-wheel steamer, 100 ft. long by 20 ft. beam; compound engines; draft, 12 in.; speed, 11 miles. Foreign service.

One gunboat, 50 ft. long by 11 ft. beam. Foreign service.

Three Yarrow's patent tubulous boilers for foreign cruisers.

One screw launch, 50 ft. long by 7 ft. beam; draft, 11 in.; speed, 8 miles. Foreign service.

Four twin-screw torpedo-boat destroyers, 190 ft. long by 19 ft. 6 in. beam; triple-expansion engines. Foreign service.

One stern-wheel steamer, 55 ft. by 8 ft. 6 in.; draft 9 in.; speed, 8 miles. Foreign service.

One stern-wheel steamer, 120 ft. long by 24 ft. beam; draft, 13 in.; speed, 13 miles. Foreign service.

One stern-wheel steamer, 68 ft. long by 12 ft. beam; draft, 12 in.; speed, 9 miles. Foreign service.

CENTRAL MARINE ENGINE WORKS, West Hartlepool.  
Output for 1895.

Name of Vessel.	Port of Registry.	H.P.
1 Maling ..	West Hartlepool ..	1,500
2 Haslingden ..	West Hartlepool ..	1,000
3 Arion ..	West Hartlepool ..	1,300
4 Rocio ..	Newport ..	800
5 Rossall ..	London ..	1,300
6 Romsdalen ..	West Hartlepool ..	1,250
7 Parklands ..	West Hartlepool ..	1,300
8 Elife ..	West Hartlepool ..	900
9 Middleton ..	Hull ..	1,300
10 Mathilda ..	Bergen ..	1,500
11 Pectan ..	London ..	2,500
12 Telena ..	London ..	2,500
13 Majestic ..	Hull ..	1,800
14 Argo ..	West Hartlepool ..	1,500
15 Aries ..	West Hartlepool ..	1,500
16 Saint Ronald ..	Liverpool ..	1,500
17 Marie Elsie ..	London ..	1,300
18 Kirkstall ..	West Hartlepool ..	900
19 Firby ..	West Hartlepool ..	1,250
20 Nanette ..	West Hartlepool ..	1,250
21 Penarth ..	Cardiff ..	1,500
22 Birtholey ..	Cardiff ..	1,250
23 Ardia ..	London ..	1,250
24 Holgate ..	London ..	1,300
		32,250

CONVERSION—

25 Scandinavian .. | Christiana .. .. . | 1,050

34,000

Total for year 1894 ..	21 Vessels ..	32,050	I.H.P.
" " " 1893 ..	25 " ..	36,550	"
" " " 1892 ..	23 " ..	34,250	"

## SCOTCH.

By MACKIE &amp; THOMSON, Govan, Glasgow.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. N.
Celtic Bard ..	Steel	Sail	British	1938-73	—
* Sark ..	"	Steam	"	151-87	45
† Effort ..	"	"	"	158-85	45
† Empress ..	"	"	"	158-85	45
† Empire ..	"	"	"	158-85	45
* W. A. Mackie ..	"	"	"	160-87	45
† Madge Ballantyne ..	"	"	"	515-30	80
† Dayspring ..	"	St. & S.	"	840-25	—
† Draco ..	"	Steam	"	139-41	45
† Dorando ..	"	"	"	139-41	45
† Excel ..	"	"	"	156-70	45
† Emblem ..	"	"	"	156-70	45

By CAIRD &amp; Co., LTD., Greenock.

† Cleopatra ..	Steel	Steam	Foreign	3,993	765
† Matta ..	"	"	British	6,063	700
† Sunda ..	"	"	"	4,673	600
† Palawan ..	"	"	"	4,686	600

\* Compound.

† Triple.

; High Pressure.

## By CAMPBELTOWN SHIPBUILDING Co., Campbeltown.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. N.
† Prosper .. ..	Steel	Steam	Foreign	1,286	116
† Caleb .. ..	"	"	"	1,806	165

## By JOHN SCOTT &amp; Co., Kinghorn, Fife.

† Benshaw .. ..	Steel	Steam	British	1,724	200
† Benhead .. ..	"	"	"	1,724	200
† Plymouth Belle ..	"	"	"	654	350
† Olio .. ..	"	"	"	1,287	150
† Raith .. ..	"	"	"	92	25
* Maggie .. ..	"	"	"	150	36

## By BARCLAY, CURLE &amp; Co., LTD., Whiteinch, Glasgow.

† Lagoon .. ..	Steel	Steam	British	704	85
† Bengloe .. ..	"	"	"	3,006	285
† Redgauntlet .. ..	"	Pad'l'e	"	277	187
† Lennox .. ..	"	Steam	"	3,677	400
† Solway .. ..	"	Sail	"	1,720	—
† Dominic .. ..	"	Steam	"	2,966	240
† Dunstan .. ..	"	"	"	2,966	240

## By SCOTT &amp; SONS, Bowling, near Glasgow.

† Thetis .. ..	Steel	Steam	British	389	100
† Girasol .. ..	"	"	"	602	90
* Penrhyn .. ..	"	"	"	365	64
* Peveril .. ..	"	"	"	303	63
No. 119 .. ..	"	100 Brk r.	"	10	—
* Sphene .. ..	"	Steam	"	411	65
* Leven .. ..	"	"	"	120	28

## By GOURLAY BROS. &amp; Co., Dundee.

† Juno .. ..	Steel	Steam	British	767	85
† Sardinia .. ..	"	"	"	1,118	220
† Oratios Couppas ..	"	"	Foreign	2,550	285
† Puri .. ..	"	"	British	936	500
† Progress .. ..	"	"	Foreign	68	60

## By W. B. THOMPSON &amp; Co., LTD., Dundee.

† Fastnet .. ..	Steel	Steam	British	1,158	260
† Lizard .. ..	"	"	"	1,175	260
* Thistle .. ..	"	"	"	210	100

## By S. McKNIGHT &amp; Co., Ayr.

* Girnigoe .. ..	Steel	Steam	British	310	65
* Nell Jess .. ..	"	"	"	510	75

## By ADAM MARR, Leith.

* St. Abbs .. ..	Wood	Steam	British	90	250
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## By JAMES MILLAR, St. Monas, N.B.

Glentauner .. ..	Wood	Sail	British	—	—
* Sapphire .. ..	"	"	"	—	35

## By JAMES ADAM, Gourrock.

Byrlie .. ..	Wood	Steam	British	18	—
Schooner Yacht ..	"	Sail	"	5	—
C.B. Fishing Skiff ..	"	"	"	2	—

## Also 8 tons of smaller coats.

## By JOHN SHEARER &amp; SON, Kelvinhaugh.

* Glenrosa .. ..	Steel	Steam	British	95	53
* Donegal Castle ..	"	"	"	278	53

## By CUMMING &amp; ELLIS, Inverkeithing, N.B.

* Venture .. ..	Steel	Steam	British	47	200
* Laurium .. ..	"	"	"	282	450
Vigilant .. ..	"	Brque.	Foreign	394	—
Speculant .. ..	"	"	"	394	—
Dog .. ..	Iron	Barge	British	70	—
Cat.. ..	"	"	"	70	—
Sun .. ..	"	"	"	70	—
Star .. ..	"	"	"	70	—
Era .. ..	"	"	"	70	—

## By ARCHD. McMILLAN &amp; SON, LTD., Dockyard, Dumbarton.

Monkbarns .. ..	Steel	Sail	British	1,911	—
General Alava .. ..	"	Steam	"	794	—
Lady Margaret .. ..	"	"	"	378	—
Gloamin .. ..	"	"	"	3,477	—

\* Compound. † Triple. ‡ High Pressure.

## By JOHN FULLERTON &amp; Co., Paisley.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. N.
* Iskenderoun ..	Steel	Steam	Foreign	142-39	60
* Sakiz .. ..	"	"	"	142-39	60
* Mermeriss .. ..	"	"	"	142-39	60
* Rebecca .. ..	"	"	British	332-18	54
* Kilkeel .. ..	Iron	"	"	252-27	39

## By RAMAGE &amp; FERGUSON, LTD., Leith.

† St. Ninian .. ..	Steel	Steam	British	836	174
† Hersilia .. ..	"	"	"	450	93
† Speedy .. ..	"	"	"	140	54
† Nubia .. ..	"	"	"	1,196	205
† Lady Sophia .. ..	"	"	"	275	62
† Corsica .. ..	"	"	"	1,104	168
* Simonette .. ..	"	"	"	30	6
† Arcturus .. ..	"	"	Foreign	475	113

## By RUSSELL &amp; Co., Port-Glasgow.

Langbank .. ..	Steel	Steam	British	4598-53	—
Kirkhill .. ..	"	"	"	3618-03	—
Dania .. ..	"	"	Foreign	3458-83	—
Port Logan .. ..	"	Sail	British	1983-89	—
Cambusdoon .. ..	"	"	"	1553-85	—
Clydesdale .. ..	"	"	"	1640-81	—
Nithsdale .. ..	"	"	"	1640-81	—
Woodburn .. ..	"	"	"	1552-31	—
Inverloch .. ..	"	"	"	1471-05	—
Invermay .. ..	"	"	"	1470-91	—
Inverneill .. ..	"	"	"	1469-73	—
Cloch .. ..	"	"	"	1459-08	—
Renfield .. ..	"	"	"	1112-41	—
Titania .. ..	"	"	"	1106-99	—
Glenmore .. ..	"	Steam	"	210-48	—
Prudente de Morals ..	"	"	"	475-06	—
Lauro Sodré .. ..	"	"	"	475-06	—
Stern Wheel Stmr. ..	"	"	"	61-03	—
2 Barges .. ..	"	"	"	14-96 ea.	—

## By A. RODGER &amp; Co., Port-Glasgow.

Glenelvan .. ..	—	Sail	—	1918-88	—
Glenfinnart .. ..	—	"	—	1968-11	—
Craigmore .. ..	—	"	—	2000-88	—
Glengowan .. ..	—	"	—	1966-76	—
Kynance .. ..	—	"	—	1963-85	—

## By CHARLES CONNELL &amp; Co., Whiteinch, Glasgow.

Riverdale .. ..	—	Steam	British	2985-49	267
Azov .. ..	—	"	Foreign	1573-98	162
Moneira .. ..	—	"	British	57-11	20
Athens .. ..	—	"	"	57-11	20
Barcelona .. ..	—	"	Foreign	4217-68	500
Cadiz .. ..	—	"	"	4217-68	500
Morven .. ..	—	"	British	3634-54	807
Manila .. ..	—	"	Foreign	4217-68	500
Ben of Airlie .. ..	—	"	British	3511-60	350

## By ALLEY &amp; MACLELLAN, Sentinel Works, Glasgow.

* Begam .. ..	Steel	Steam	—	80	50
* Rani .. ..	"	"	—	80	50
* 2 Launches .. ..	"	"	—	ea. 8	ea. 10
* Paddle Steamer ..	"	"	—	190	80
* " .. ..	"	"	—	190	80
* " .. ..	"	"	—	190	80
* " .. ..	"	"	—	190	80
† 2 Barges .. ..	"	"	—	ea. 40	ea. 8
1 Hopper Barge ..	"	"	—	140	—
1 " .. ..	"	"	—	140	—
1 " .. ..	"	"	—	140	—
1 " .. ..	"	"	—	140	—
Barge .. ..	"	"	—	55	—
" .. ..	"	"	—	30	—
Pontoon .. ..	"	"	—	60	—
† 1 Steamer .. ..	"	"	—	45	80
† 1 " .. ..	"	"	—	45	80
† 1 " .. ..	"	"	—	45	80

## By DUNDEE SHIPBUILDERS' Co., LTD., Dundee.

Balgay .. ..	Steel	Steam	British	240	45
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\* Compound. † Triple. ‡ High Pressure.



## By FIFE &amp; SON, Fairlie.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. N.
Almida .. ..	Wood	Sail	British	14	—
Spider .. ..	"	"	"	2½	—
C. B. Fly .. ..	"	"	"	3	—
Fairlie .. ..	"	"	"	2½	—
Isolde .. ..	Composite	"	"	81	—
Nanta .. ..	Wood	"	"	8	—
Klyama .. ..	"	"	"	9	—
Louise .. ..	"	"	"	4	—
C. B. Evoe .. ..	"	"	"	3	—
Eachans .. ..	"	"	"	27	—
C. B. Squaw .. ..	"	"	"	2½	—

## By HALL, RUSSELL &amp; Co., Aberdeen.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. I.
† Norwood .. ..	Steel	Steam	British	800	1,676
* Bentley .. ..	"	"	"	152	320
* Frigate Bird .. ..	"	"	"	100	280
* Betty Inglis .. ..	"	"	"	110	810
† King Sing .. ..	"	"	"	2,000	2,000
* Eleazar .. ..	"	"	"	112	310
* Craigellachie .. ..	"	"	"	112	810
* Craig-Gowan .. ..	"	"	"	112	310
C .. ..	"	Cargo	"	250	—
D .. ..	"	Lig't'r	"	250	—

## By ABERCORN SHIPBUILDING Co., Paisley.

† Ferrent .. ..	Steel	Steam	British	800	4,000
† Zephyr .. ..	"	"	"	800	4,000

## By ALEXR. STEPHEN &amp; SONS, Linthouse, Govan, Glasgow.

† Durward .. ..	Steel	Steam	British	1,804	2,390
† Benalder .. ..	"	"	"	3,196	1,925
† Sumatra .. ..	"	"	"	4,838	3,470
† Oceana .. ..	"	"	"	3,706	1,500
† Magdala .. ..	"	"	"	3,687	1,500

## By A. &amp; J. INGLIS, Pointhouse, Glasgow.

† Onda .. ..	Steel	Screw	British	5,247	2,500
† Spaniel .. ..	"	"	"	1,116	1,800
Ailsa .. ..	Composite	Cut'er	"	116	—
Dandie Dinmont .. ..	Steel	Pad'le	"	218	1,200
† Iverna .. ..	"	"	"	995	2,200
† Queen o' the May .. ..	"	Screw	"	240	not eng. by us.
† No. 235 .. ..	"	Yacht	"	550	700
	"	Pad'le	"	550	700

## By JOHN REID &amp; Co., LTD., Whiteinch, Glasgow.

† Fujiyama .. ..	4 Steel	Steam	British	—	—
† Bantam .. ..	"	"	"	—	—
† Bulrush .. ..	St. Yachts	"	"	480	950
† Cala-mara .. ..	"	"	"	—	—
† Palena (to be launched this year)	Steel	"	Foreign	2,553	3,600

## By MURDOCH &amp; MURRAY, Port-Glasgow.

* Rio Xapury .. ..	Steel	Steam	Foreign	250	440
† Rio Paubiny .. ..	"	"	"	460	730

## By WM. HAMILTON &amp; Co., Port-Glasgow.

† Alagonia .. ..	Steel	Steam	British	2,700	1,656
† Flying Buzzard .. ..	"	"	"	880	865
† Bonchetha .. ..	"	"	"	70	330
† Thistle .. ..	"	Sail	"	107	—

## By LONDON AND GLASGOW SHIPBUILDING Co., Govan, Glasgow.

† Goodwin .. ..	Steel	Steam	British	4,420	2,800
† Sylvania .. ..	"	"	"	5,600	5,500
† Carinthia .. ..	"	"	"	5,600	5,500
† Vimeira .. ..	"	"	"	2,710	1,500
† Kut Wo .. ..	"	"	"	2,110	1,500

## By GRANGEMOUTH DOCKYARD Co., Grangemouth.

† Joseph Soicluna .. ..	Steel	Steam	British	1,715	1,500
† Naushan .. ..	"	"	"	2,243	1,200

\* Compound. † Triple. ‡ High Pressure.

## By AILSA SHIPBUILDING Co., Troon, N.B.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. I.
† Granuaile .. ..	Steel	Steam	British	383	500
* Bishop Rock .. ..	"	"	"	495	450
* Beacon Rock .. ..	"	"	"	495	450
† Zara .. ..	"	StYct.	"	422	800
Dalblair .. ..	"	Sail	"	1,630	—
† Minona .. ..	"	StYct	"	100	200

## By LOBNITZ &amp; Co., Slip Dock, Renfrew.

† Doris .. ..	Steel	StYct.	British	134	325
† Nicolai II .. ..	"	Steam	Foreign	2,533	1,100
† Alexandra .. ..	"	"	"	2,533	1,100
† Xenia .. ..	"	"	"	2,533	1,100
* Saint Jacques .. ..	"	"	"	96	200
* Emile Duchemin .. ..	"	"	"	96	200
† Britannic .. ..	"	Hop'r.	British	667	800
† Mexico .. ..	"	Hop'r.	"	1,500	1,500
	"	Dr'gr.	"	—	—
* Number 2 .. ..	"	StTug	"	19	65
* Gunboat Engines .. ..	"	—	Foreign	—	1,300
2 Hopper Barges .. ..	Steel	—	"	200	—
* Dredger .. ..	"	Steam	"	500	800

## By FLEMING &amp; FERGUSON, Paisley.

* Caroni .. ..	Steel	Steam	Foreign	100	500
† Teir-el-Mina .. ..	"	"	"	200	600
* Atlas .. ..	"	"	British	100	500
* Etna .. ..	"	"	"	100	500
8 Hopper Barges .. ..	"	Towg.	"	1,200	—
* Cambois .. ..	"	Steam	"	600	700
* 3 Hopper Steamers .. ..	"	"	"	1,800	1,800
* Tautauji .. ..	"	"	Foreign	300	450
* Kirishima .. ..	"	"	"	300	450
* Marishima .. ..	"	"	"	300	450
* Dredger .. ..	"	"	"	400	400
† 1 Set Engines .. ..	—	—	British	—	1,500
8 Sets Triangular Contg-Rod Engines	—	—	Foreign	—	8,450
† 1 Set Engines .. ..	—	—	British	—	800

## By NAPIER, SHANKS &amp; BELL, Yoker, Glasgow.

Shengking .. ..	Steel	Steam	British	1,650	1,450
2 Barges .. ..	"	Sail	Foreign	28	—
Launch .. ..	"	Steam	"	7	35
Steamer P. .. ..	"	"	"	108	130

## By MONTROSE SHIPBUILDING AND ENGINEERING Co., LTD., Montrose.

* Dolphin .. ..	Steel	Steam	British	348	350
* Savoy .. ..	"	"	"	348	350

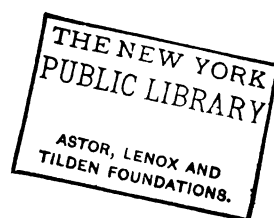
## By FAIRFIELD SHIPBUILDING &amp; ENGINEERING Co., LTD., Govan, Glasgow.

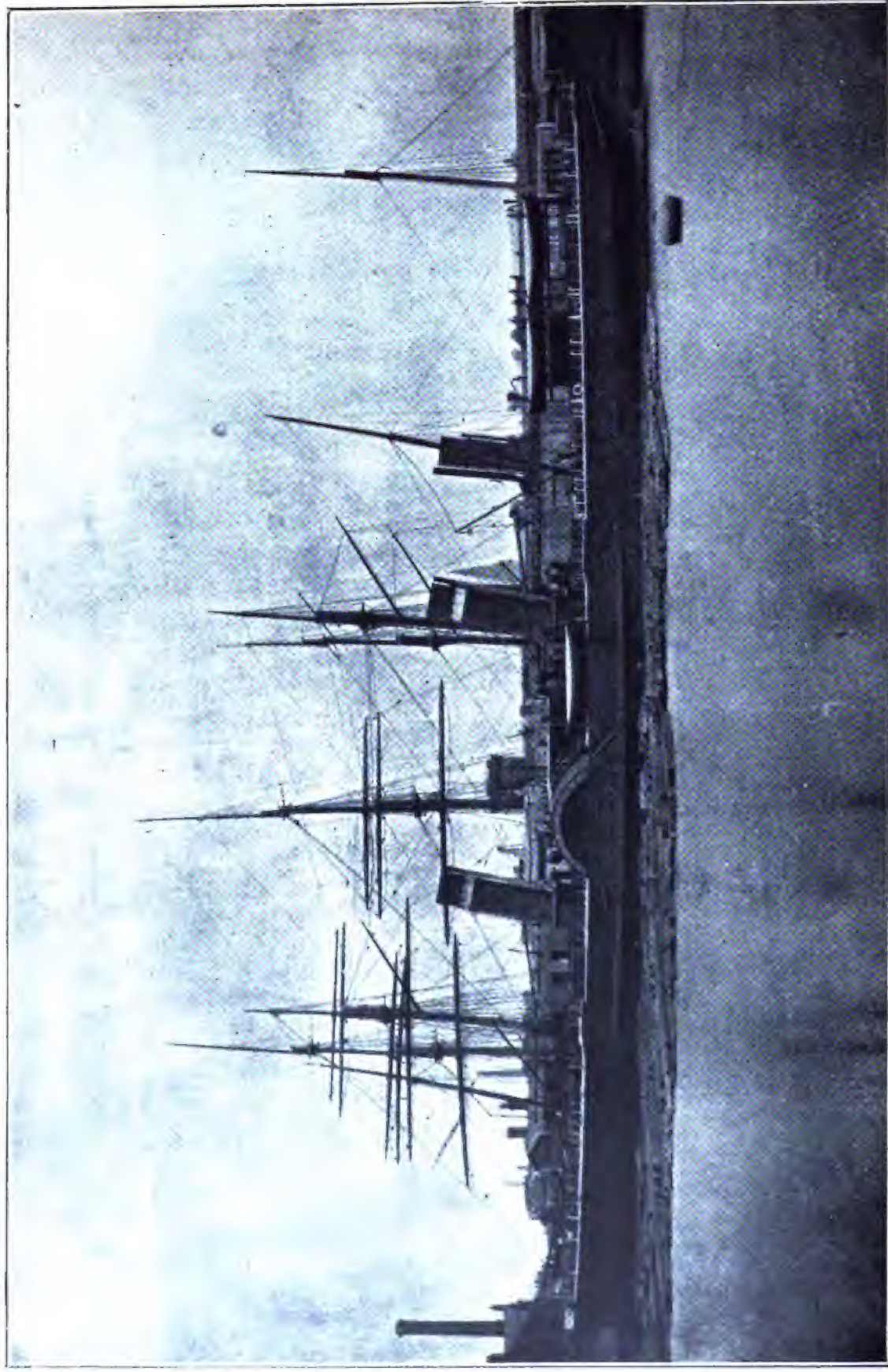
H.M.S. Handy .. ..	Steel	Steam	British	279	—
" Hart .. ..	"	"	"	279	—
" Hunter .. ..	"	"	"	279	—
" Venus .. ..	"	"	"	5,600	—
" Diana .. ..	"	"	"	5,600	—
Keong Wai .. ..	"	"	"	1,777	—
Koningin Wilhelmina .. ..	"	"	Foreign	1,870	—
Koningin Regentes .. ..	"	"	"	1,870	—
Prins Hendrik .. ..	"	"	"	1,870	—
Chow Tai .. ..	"	"	British	1,800	—
Wong Koi .. ..	"	"	"	1,800	—
Total, 35,200					—

## By SCOTT &amp; Co., Cartdyke, Greenock.

Hunan .. ..	Steel	Steam	—	1,885	1,350
Kalgan .. ..	"	"	—	1,885	1,350
Kanau .. ..	"	"	—	1,885	1,350
Diomed .. ..	"	"	—	4,280	2,800
Menelaus .. ..	"	"	—	4,258	2,800
Kashing .. ..	"	"	—	1,885	1,350
Szechuen .. ..	"	"	—	1,885	1,350
Foochow .. ..	"	"	—	2,080	1,350
Pakhoi .. ..	"	"	—	2,023	1,350
Wuhu .. ..	"	"	—	2,026	1,350
Tientsin .. ..	"	"	—	2,026	1,350
Greta .. ..	"	"	—	338	600

\* Compound. † Triple. ‡ High Pressure.





THE S.S. "PRINCE OF WALES." THE FLEETWOOD AND BELFAST SERVICE

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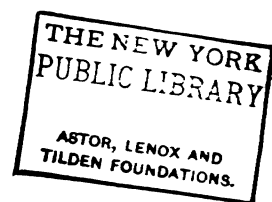


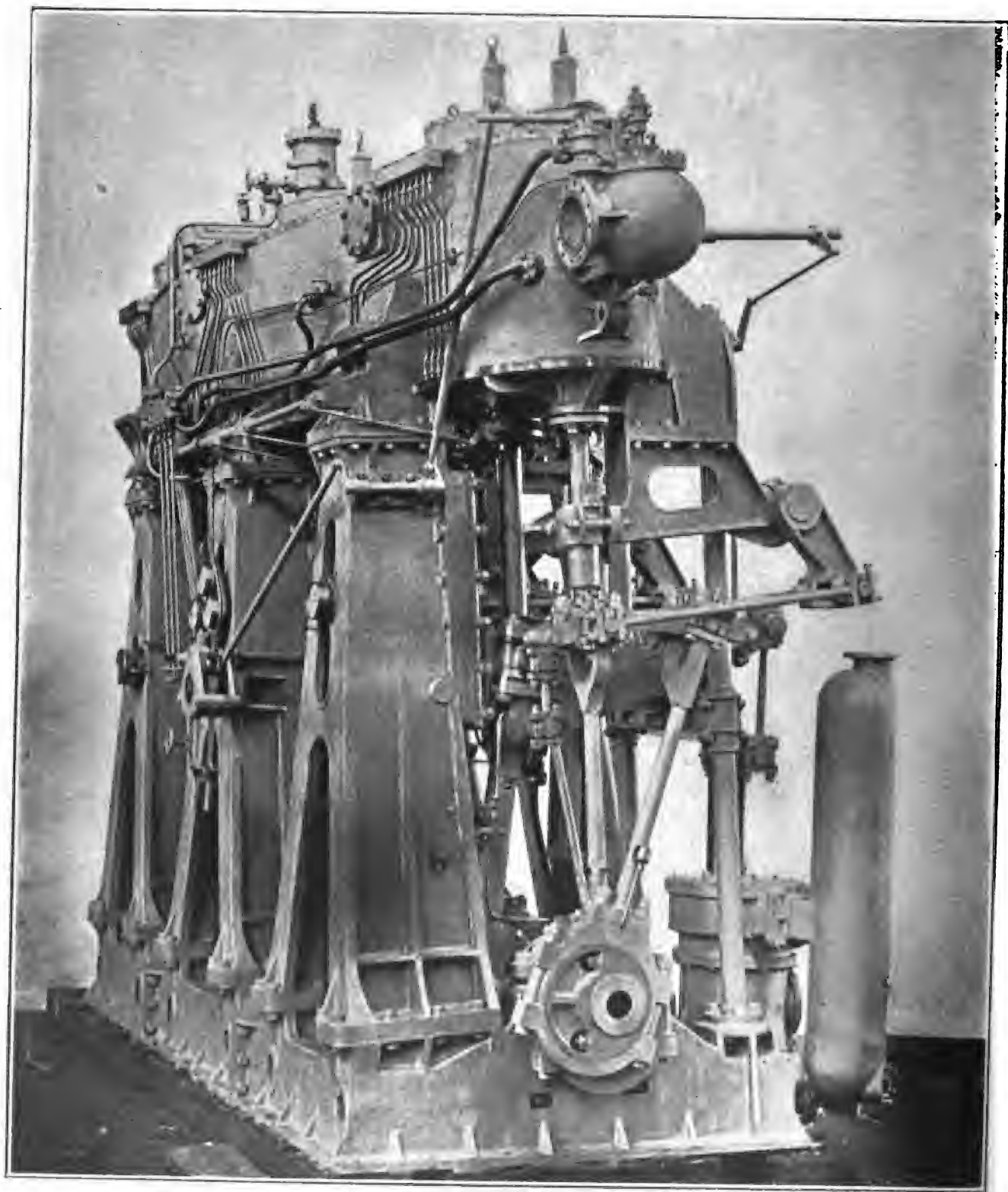
[January 1, 1896.



THE TWIN-SCREW STEAMER "DUKE OF YORK" ON THE FLEETWOOD & BELFAST SERVICE.  
BUILT BY MESSRS. DENNY BROS., DUNBARTON.

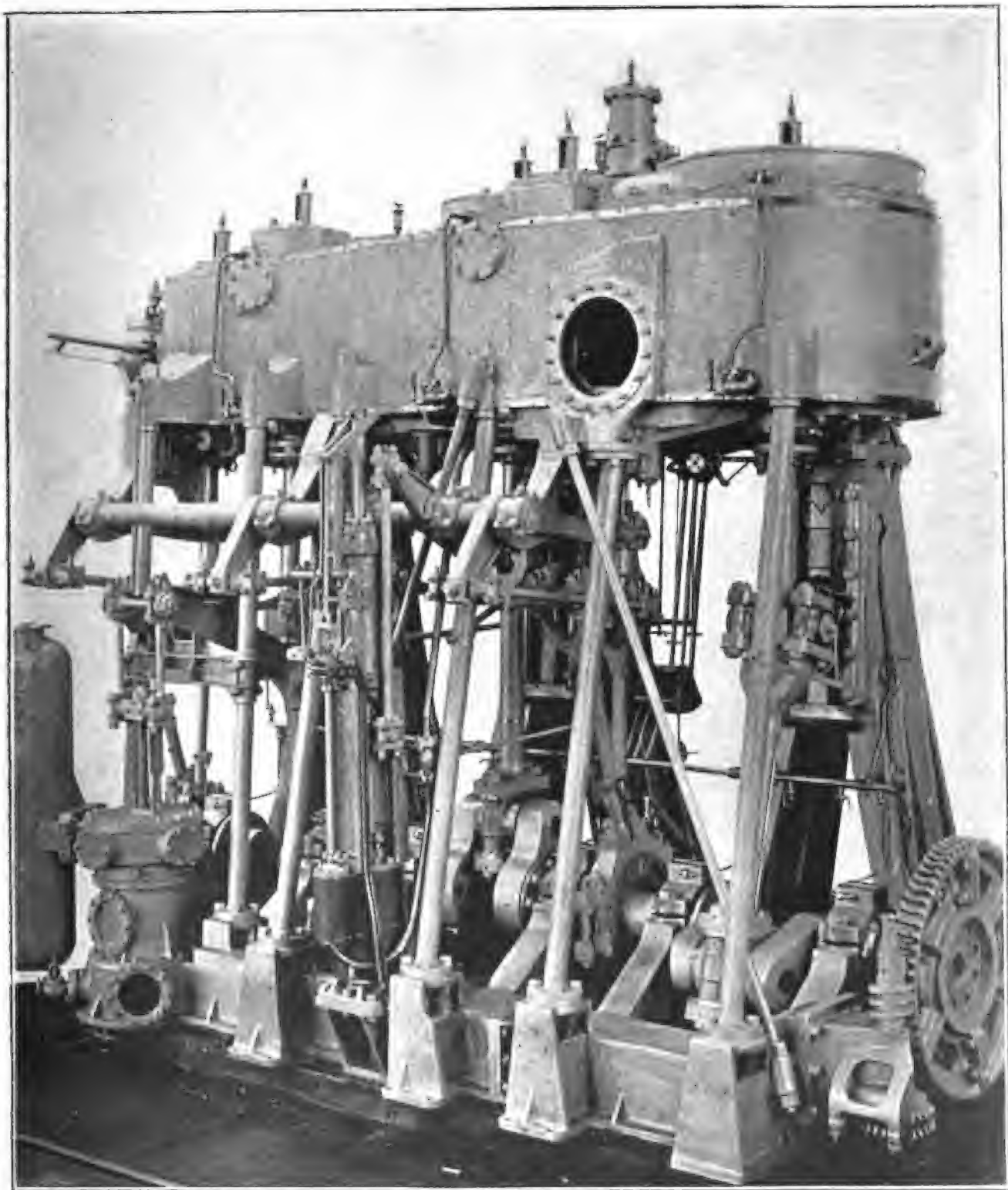




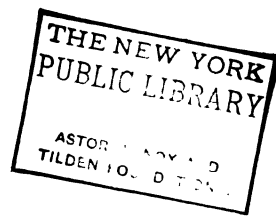


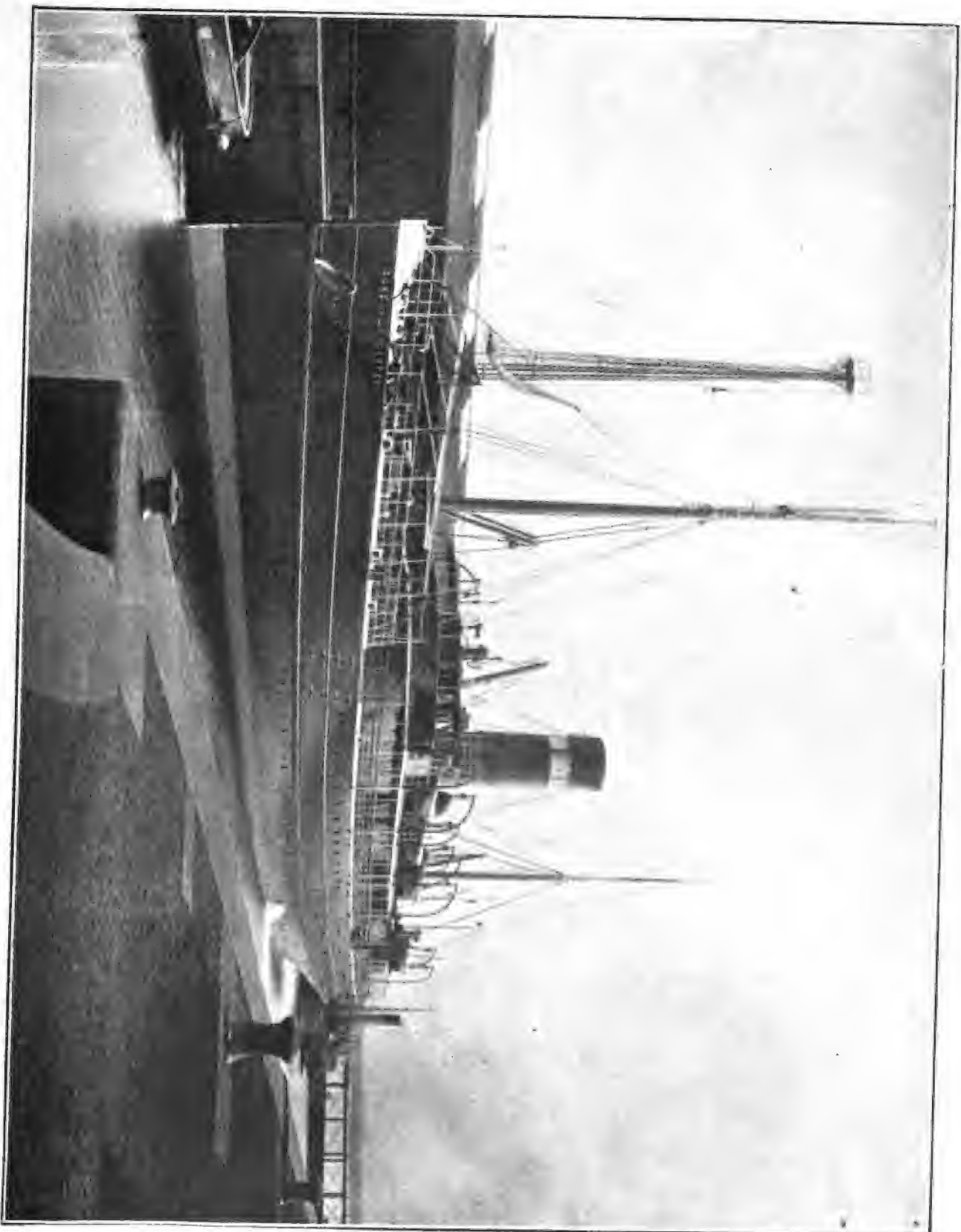
TRIPLE EXPANSION ENGINES OF THE

[ *January 1, 1896.*



SCREW STEAMER "DUKE OF LANCASTER."

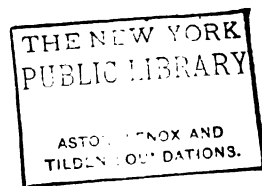




TWIN-SCREW STEAMER "DUKE OF LANCASTER" ON THE FLEETWOOD & BELFAST SERVICE.

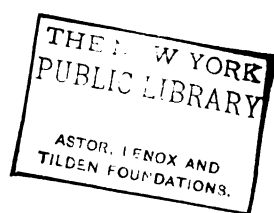
BUILT BY THE NAVAL CONSTRUCTION AND ARMAMENTS CO., LTD., BARROW-IN-FURNESS.







THE TWIN-SCREW STEAMER "DUKE OF CLARENCE" ON THE FLEETWOOD AND BELFAST SERVICE  
BUILT BY MESSRS. LAIRD BROS., BIRKENHEAD.



By SIMONS &amp; Co., LTD., Renfrew, N.B.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. I.
* St. Lawrence ..	Steel	Steam	British	650	850
† Salford .. ..	"	"	"	650	920
† Octopus .. ..	"	"	Foreign	1,360	2,500
† Walter Glynn ..	"	"	British	1,250	1,600
† Ortoire .. ..	"	"	Foreign	450	425
* Devon .. ..	Steel	"	British	600	755
* No. 329 .. ..	"	"	"	1,250	940
* " 331 .. ..	"	"	Foreign	200	200
† Prompt .. ..	Steel	"	"	50	285
† No. 333 .. ..	"	"	"	200	100

By DAVID &amp; WILLIAM HENDERSON &amp; Co., Partick, Glasgow.

† Kaisow .. ..	Steel	Steam	British	3,920	3,000
† Cervantes .. ..	"	"	"	4,639	4,000
* Oarss .. ..	Composite	Sail	"	40	—
† Moyune .. ..	Steel	Steam	"	4,646	4,000
† Teenkai .. ..	"	"	"	4,642	4,000
† Veglia .. ..	"	"	Foreign	1,111	2,600
† Catania .. ..	"	"	British	668	1,750
† Valkyrie .. ..	Composite	Sail	"	120	—
† Horace .. ..	Steel	Steam	"	3,334	3,000
† Juanita .. ..	"	"	"	718	750
18 Barges .. ..	Composite	"	Foreign	666	—

By WM. DENNY &amp; Bros., Leven Ship Yard, Dumbarton.

Rosstrevor ..	Steel	Steam	British	1,094	—
Okhla .. ..	"	"	"	5,288	—
Vladimir ..	"	"	Foreign	5,331	—
Emperor Nicolas II. ..	"	"	"	4,071	—
Ava .. ..	"	"	British	3,895	—
Okara .. ..	"	"	"	5,291	—
Voronej .. ..	"	"	Foreign	5,331	—
Dover .. ..	"	"	British	988	—
4 Twin Screw .. ..	"	"	Foreign	425	—
4 Paddle Steamers ..	"	"	"	1,701	—
8 Barges .. ..	"	"	"	1,613	—
				Total, 30,404	

By DAVID J. DUNLOP &amp; Co., Port-Glasgow.

† Chesapeake ..	Steel	Steam	British	4,600	3,000
* London .. ..	"	"	Foreign	120	850
* Marseilles .. ..	"	"	"	120	350
* Liverpool .. ..	"	"	"	120	850
* Odessa .. ..	"	"	"	120	350
* Christine .. ..	"	"	"	120	200

† Steam yacht fitted with new boiler.

By J. &amp; G. THOMSON, Clydebank, N.B.

Duchess of Rothesay ..	—	Steam	British	—	—
Greyhound .. ..	—	"	"	—	—
Terrible .. ..	—	"	"	—	—
Hernan Cortes .. ..	—	"	Foreign	—	—
Pizarro .. ..	—	"	"	—	—
Vasco Nunez de Balboa ..	—	"	"	—	—
Diego Velazquez ..	—	"	"	—	—
Ponce de Leon .. ..	—	"	"	—	—
Alvarado .. ..	—	"	"	—	—
Sandoval .. ..	—	"	"	—	—
Jupiter .. ..	—	"	British	—	—
Urania .. ..	—	"	Foreign	—	—
Pelorus (Machinery only)	—	"	British	—	—
				Totals, 32,197	50,720

By J. McARTHUR &amp; Co., Paisley.

Caledonia .. ..	—	Steam	British	57	230
Glentow .. ..	—	"	"	144	200
Scott .. ..	—	"	Foreign	31	30
Rajahmundry .. ..	—	"	"	143	400
Kavur .. ..	—	"	"	143	400
2 Barges .. ..	—	"	"	24	—

By R. NAPIER &amp; SONS, LTD., Lancefield, Glasgow.

Menes .. ..	Steel	Steam	—	2,500	2,000
† Paknam .. ..	"	"	Foreign	700	800
Donai .. ..	"	"	—	800	900
Australian .. ..	"	"	—	2,600	2,000

\* Compound. † Triple. ‡ High Pressure.

By BLACKWOOD &amp; GORDON, Port-Glasgow.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. I.
† Wicklow .. ..	Steel	Steam	British	1,248	8,800
† Daisy .. ..	"	"	"	565	870

By ROBERT DUNCAN &amp; Co., LTD., Port-Glasgow.

East African ..	Steel	Sail	British	1730-90	—
† Dorothy .. ..	"	Steam	"	134-62	170
* Gibel Musa .. ..	"	"	"	873-57	450
† Ganges .. ..	"	"	"	375-91	670

By JOHN CRAN &amp; Co., Leith.

Minnie .. ..	Steel	Steam	British	32	124
Gwennie .. ..	"	"	"	32	124
2 Launches .. ..	"	"	Foreign	—	—
* Copley (engined) ..	"	"	"	—	200
* Venture .. ..	"	"	"	—	85

HAWTHORNS &amp; Co., Leith.

* Chancellor ..	Steel	Steam	British	169	275
* Revenge .. ..	"	"	"	116	400
* Cedric .. ..	Iron	—	"	184	—
† Jules Michel ..	Steel	Steam	Foreign	154	800

Machinery turned out by Messrs. DENNY &amp; Co., Dumbarton, in the year ending 31st December, 1895.

Name of Vessel.	Description of Machinery.	Trade.
Semiramis ..	Triple single screw ..	Eastern
Rosstrevor ..	Triple twin screw ..	Channel
Okhla .. ..	Triple single screw ..	Eastern
Vladimir ..	Triple twin screw ..	Eastern
Atlas .. ..	Compound twin screw ..	River
Sikh .. ..	Triple paddle ..	River
Nicholas II. ..	Triple single screw ..	Eastern
No. 424 .. ..	Compound twin screw ..	River
Ava .. ..	Triple single screw ..	Eastern
Bhurntpore ..	Triple paddle ..	River
Bhopal .. ..	Triple paddle ..	River
Okara .. ..	Triple single screw ..	Eastern
No. 429 .. ..	Compound twin screw ..	River
" 430 .. ..	Compound twin screw ..	River
Uluwar .. ..	Quadruple paddle ..	River

Total Effective Horse Power, 30,400.

Engines completed during 1895 by Bow, McLACHLAN &amp; Co., Thistle Works, Paisley.

I.H.P.

Eight sets Triple-expansion, Compound-surface-condensing and High-pressure Screw Engines ..	1,730
Five sets Stern-wheel Engines ..	480
Four sets Compound-surface-condensing Paddle Engines ..	1,900
Auxiliary Engines for Steamers ..	2,880

Total I.H.P. 1895 .. 6,440

Total I.H.P. 1894 .. 7,590

## IRISH.

By WORKMAN, CLARK, &amp; Co., LTD., Belfast.

Name of Vessel.	Built of	Steam	Owners.	G. T. Regis.	H. P. I.
† Star of New Zealand ..	Steel	Steam	British	4,713	2,500
† Mount Sirion .. ..	"	"	"	3,280	1,850
† Mourne .. ..	"	"	"	3,224	2,060
† Statesman .. ..	"	"	"	6,322	3,400
† Pakling .. ..	"	"	"	4,447	3,600
† Ardandearg .. ..	"	"	"	3,218	1,750
† Kintuck .. ..	"	"	"	4,447	3,600
† Hyson .. ..	"	"	"	4,447	3,600
† Langton Grange .. ..	"	"	"	5,825	2,750
† Centaur .. ..	"	"	"	1,900	900
† Charon .. ..	"	"	"	1,900	900

\* Compo † Triple. ‡ High Pressure.

## By HARLAND &amp; WOLFF, Belfast.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. I.
† Georgic .. ..	Steel	Steam	British	10,077	4,200
† Victorian .. ..	"	"	"	8,767	4,500
† Armenian .. ..	"	"	"	8,765	4,500
† American .. ..	"	"	"	8,196	2,700
† Historian .. ..	"	"	"	6,857	2,900
† Cestrian .. ..	"	"	"	8,769	4,500
† Vedamore .. ..	"	"	"	6,662	3,500
Germanic .. ..	Re-engine d only			—	6,500
Doric .. ..					3,200

## By QUEENSTOWN AND PASSAGE DRY DOCKS Co., Passage West, Co. Cork.

Aileen .. ..	Wood	Sail	British	47-0	—
Faugh-a-Ballagh ..	Steel	—	"	43-7	—
* Ross .. ..	"	Steam	"	38-2	20-5
* Emu .. ..	"	"	"	38-2	20-5
* Wilk .. ..	"	"	"	38-2	20-5
* Mab .. ..	"	"	"	38-2	20-5
* Ida .. ..	"	"	"	38-2	20-5

## AMERICAN.

## By GLOBE IRON WORKS Co., Cleveland, O., U.S.A.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. N.
* North Land .. ..	Steel	Steam	Amercn	4,244	7,000
* Tyrone .. ..	"	Sail	"	2117-72	—
* Alpha .. ..	"	Steam	"	132-23	130
C.B.C.B.Co. 1 .. ..	"	Tow Barge	"	133-19	—
" 2 .. ..	"	"	"	"	—
" 3 .. ..	"	"	"	"	—
" 4 .. ..	"	"	"	"	—
" 5 .. ..	"	"	"	"	—

## By DELAWARE RIVER IRON SHIPBUILDING AND ENGINE WORKS, Chester, Pa.

Columbia .. ..	Iron	Steam	Amercn	810-29	90
Vermont .. ..	"	"	"	810-29	90
† Oneonta .. ..	Steel	"	"	146	160
* Riverside .. ..	"	"	"	452-88	60

## By HARLAN AND HOLLINGSWORTH, Co., Wilmington, Del., U.S.A.

Howard .. ..	Steel	Steam	Amercn	2551-38	2,600
* Amorita* .. ..	"	Scho'r Yt.	"	69-02	—

\*The Amorita fastest schooner in the States.

## By PORTLAND SHIPBUILDING Co., Portland, M.E., U.S.A.

* Sebasscodegan ..	Wood	Steam	Amercn	210	180
* Santa Maria .. ..	"	"	"	40	20
* Louise .. ..	"	"	"	45	25

## By WM. CRAMP AND SONS, Philadelphia, U.S.A.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. I.
* St. Paul .. ..	Steel	Steam	Amercn	11,629-21	20,000
* Comanche .. ..	"	"	"	3,203-44	3,000
* Theopia .. ..	"	"	"	311-	800
† Brooklyn .. ..	"	"	"	9,150-	18,000
* Curacao .. ..	"	"	"	1,500-	900

## By CHICAGO SHIPBUILDING Co., Chicago, Ill., U.S.A.

Malta .. ..	Steel	Sail	Amercn	2287-48	—
Marcia .. ..	"	"	"	2287-48	—
† Victory .. ..	"	Steam	"	3744-90	1,900
† Zenith City .. ..	"	"	"	3850-49	1,900
Aurania .. ..	"	Sail	"	3113-26	—

## By F. W. WHEELER &amp; Co., West Bay City, Mich., U.S.A.

† John J. McWilliams	Steel	Steam	Amercn	—	1,800
* I. Watson Stephenson	Wood	"	"	—	650
† Wapite (Yacht) ..	Steel	"	"	—	400
† Penobscot .. ..	"	"	"	—	2,000
† Simon J. Murphy ..	"	"	"	—	800
† Katahdin .. ..	"	"	"	—	800

\* Compound. † Triple. ‡ High Pressure. a Quadruple.

## By FORE RIVER ENGINE Co., Weymouth, Mass., U.S.A.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. I.
† Rajah .. ..	Wood	Steam	Amercn	40	160
Savitar .. ..	"	Sail	"	5	—
Barnade .. ..	"	Std Sa.	"	15	15
Kayoshk .. ..	"	Sail	"	5	—
Satanic .. ..	"	"	"	5	—
* Queen .. ..	"	Steam	"	15	60
† Alcedo (Machinery)	"	"	"	80	300

## By ATLANTIC WORKS, East Boston, Mass., U.S.A.

* Calypso .. ..	Wood	Steam	Amercn	97	200
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## GERMAN.

## By RICKMERS Co., Bremerhaven.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. N.
† Wangeroog .. ..	Steel	Steam	German	131	76
† Spiekeroog .. ..	"	"	"	131	76

## By J. W. KLAUITTER, Danzig.

* Hekla .. ..	Steel	Steam	German	240	250
* Warschau .. ..	"	"	"	320	250
† Balder .. ..	"	"	"	690	400
† No. 200 .. ..	"	"	"	1,002	600

## By GEBRUDER SACHSENBERG, Gesellschaft mit beschränkter Haftung, Rossau, Elbe, Anhalt.

† Louis Gutzjahr IX.	Steel	Steam	German	480	750
† Gebr. Fendel IV...	"	"	"	480	750
* Vorwärts I. ..	"	"	"	340	600
* Vorwärts II. ..	"	"	"	340	600
* Habicht .. ..	"	"	"	300	400
† Continental ..	"	"	Foreign	36	40
* No II. .. ..	"	"	German	300	400
* Clara .. ..	"	"	"	80	150
* Bagger IV. ..	"	"	"	86	40
Baggerprahm ..	"	Sail	"	100	—
" .. ..	"	"	"	100	—
" .. ..	"	"	"	100	—
" .. ..	"	"	"	100	—
Richter .. ..	"	"	"	400	—

## By GERMANIA-WERFT, Kiel.

† Boun .. ..	Steel	Steam	German	3,970	450
† Hallé .. ..	"	"	"	3,970	450
† Kalmar .. ..	"	"	"	1,232	150
* Nachtigall .. ..	"	"	"	—	75
Hestha .. ..	"	Race Y'ht	"	—	—
Vineta .. ..	Composite	"	"	—	—

## By SCHIFFSWERFT VON HENRY KOCH, Lübeck.

Wellingdorf ..	Steel	Ligh'r	German	500	—
Neumühlen .. ..	"	"	"	500	—
* Nordsee .. ..	"	Steam	"	365	120

## By SCHIFFSWERFTE UND MASCHINENFABRIK, A.G., Hamburg.

* Sao José .. ..	Steel	Steam	German	73-5	25
* Blankenese .. ..	"	"	"	137-1	2 x 15
* Mockba .. ..	"	"	Russian	154-9	2 x 12
* Fairplay .. ..	"	"	German	63-4	30
* T. P. W. Lütgens	"	"	"	43-5	20
* Barkasse IV. ..	"	"	"	—	5
* Gaspard .. ..	"	"	"	—	5
Accumulator ..	"	Electric	"	17-7	10 Eff.

## By J. C. TECKLENBURG, Geestemünde.

* Potosi .. ..	Steel	Sail	German	4,025	—
* Willy .. ..	"	Steam	"	137	300
† Parel .. ..	"	"	"	137	300
* Fritz .. ..	"	"	"	137	300
† Neck .. ..	"	"	"	137	300
† Fulius Wieting ..	"	"	"	137	300
† Elma .. ..	"	"	"	135	300
* Doggerbank .. ..	"	"	"	135	300
† Oldenburg .. ..	"	"	"	135	300
* Seehund .. ..	"	"	"	135	300

\* Compound. † Triple. ‡ High Pressure.



## By HOWALDTSWÄRKE, Kiel.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. I.
† Escout .. ..	Steel	Steam	Belgian	1,143	500
† Germania .. ..	"	"	German	2,273	1,000
† Rupaner .. ..	"	"	Chilian	872	600
† Prinz Adalbert ..	"	"	German	702	1,300
† Vorivart .. ..	"	"	"	1,027	600
† Else .. ..	"	"	"	1,200	650

REIHERSTIEG-SCHIFFSWERFTE UND MASCHINENFABRIK, Hamburg.

† Argentina .. ..	Steel	Steam	German	3,830	1,500
† Paranagua .. ..	"	"	"	2,803	1,150
† Cordoba .. ..	"	"	"	4,700	1,900

FLENSBURGER SCHIFFSBAU GESELLSCHAFT, Flensburg.

† Guttrune .. ..	Steel	Steam	German	1,385	550
† Oberbürgermeister Haken .. ..	"	"	"	1,280	750
† Finland .. ..	"	"	Foreign	1,494	550
† Flensburg .. ..	"	"	German	4,435	1,800
† Thekla .. ..	"	"	"	3,689	1,500
† Icebreaker .. ..	"	"	"	50	—
† Mercur .. ..	"	"	"	1,435	550
† Alfred Menzell ..	"	"	"	1,417	550
S.S. No. 161 Bengalore .. ..	"	"	"	5,300	1,900

By VULCAN CO., Stettin, German.

† Orefeld .. ..	Steel	Steam	German	3,970	1,800
† Aachen .. ..	"	"	"	3,970	1,800
† 2. Torpedoboote ..	"	"	China	ea. 105	1,600
† Fey Ying .. ..	"	"	"	ea. 762	5,500
† Willow .. ..	"	"	German	49	60
† Yasmund .. ..	"	"	"	49	60
† D. P. X. .. ..	"	"	"	ea. 254	200
† D. P. VII. .. ..	"	"	"	ea. 321	210
† D. P. VIII. .. ..	"	"	"	ea. 321	210
† D. P. IX. .. ..	"	"	"	ea. 321	210
† B. VII. .. ..	"	Bag'r	"	ea. 318	200
† Stadt Reval .. ..	"	Steam	Russia	658	1,600

## AUSTRIAN.

By MARCO U. MARTINOLICH, Lussinpiccolo.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. N.
Maria B .. ..	Steel	Steam	Austria	377	65
Tommaseo .. ..	"	"	"	75	30
Briom (Yacht) .. ..	"	"	"	40	20
Dragica .. ..	Composite	"	"	45	20

By STABILIMENTO TECNICO, Trieste.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. I.
† Wien .. ..	Steel	Steam	Austria	5,600	9,500
† No. 1 (Dredger) ..	"	"	"	460	200
† Graf Wurmbrand ..	"	"	"	952	2,800
† Fronia Cuppa .. ..	"	"	Foreign	477	360
† Prorok Iona .. ..	"	"	"	480	360
† Monarch .. ..	Engines	only	"	—	9,500

## SWEDEN.

By KOCKUMS MEKANISKA, Werkstads, Malmo.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. N.
* Smiril .. ..	Steel	Screw	Danish	153	40

By W. LINDBERGS VERKSTADS OCH VARFS AKTIEBOLAG, Stockholm.

* Morjak .. ..	Steel	Steam	Russian	61-21	50
* Progress .. ..	"	Tug	"	17-35	25
				58-15	
				28-09	

\* Compound. † Triple. ‡ High Pressure. § Quadri p's.

## HOLLAND.

By SOCIETE ANONYME "CHANTIERS CONRAD," HAARLEM.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. I.
* Kairouan II. ..	Steel	Steam Pump and Buck't Dredg	French	200	195
* Riasan .. ..	"	"	Russian	320	500
* San José .. ..	"	Hop'r	Spanish	220	200
* Progress .. ..	"	Pump	Russian	100	140
		Dredg			
Barges 1 to 5 ..	Iron	Tow'g	Spanish	90	
* Dnieprofskaia 3 ..	Steel	Buck't and Pump Dredg	Russian	300	375
* Volskai 4 .. ..	"	"	"	280	425
* Sandormen .. ..	"	Pump	Danish	60	100
		Dredg			

MAATSCHAPPIJ DE MAAS, Rotterdam.

† Reynst .. ..	Steel	Steam	Dutch	1200	800
* Panaroekan .. ..	"	Tug	"	—	60
* Achilles .. ..	"	Steam Ice-br'ker & Tug	"	—	250

## FRENCH.

SOCIETE ANONYME DES ATeliers ET CHANTIERS DE LA LOIRE, St. Nazaire.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. N.
† Cordilleras .. ..	Steel	Steam	French	3,290	1,490
† Compeças .. ..	"	"	"	3,290	1,490

SOCIETE ANONYME DES FORGES ET CHANTIERS DE LA MEDITERRANEE.

* Yacht .. ..	Steel	Steam	French	10	7
* Scouting Boat .. ..	"	"	"	6-100	12-5
Vulfran-Puget .. ..	"	Sail	"	5,794-867	—

COMPAGNIE DES MESSAGERIES MARITIMES, La Ciotat.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. I.
† Cordillère .. ..	Steel	Steam	French	6,450	5,800

## DENMARK.

By BÜRMEISTER &amp; WAIN, Copenhagen.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. N.
† Standart .. ..	Steel	Steam	Foreign	3,800	2,500
* Kjobenkaon .. ..	"	"	Danish	1,091	300
* Sleipner .. ..	"	"	"	780	400

By ELSINORE IRON SHIPBUILDING AND ENGINEERING CO., Elsinore.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. I.
† Gustaf Wasa .. ..	Steel	Steam	Foreign	414	330
† Helge .. ..	"	"	Danish	2005	650
† Christiania .. ..	"	"	Foreign	615	800
† Mjølner .. ..	"	"	Danish	70	280
† Achilles .. ..	"	"	Foreign	942	400
† Vestkysten .. ..	"	"	Danish	135	300

\* Compound. † Triple. ‡ High Pressure.

## NORWAY.

By BERGENS MEKANISKE VÆRKSTED, A.B., Bergen.

Name of Vessel.	Built of	Class.	Owners.	G.T. Regis.	H.P. N.
† Condor .. ..	Steel	Steam	Norweg.	663	94
† Genova .. ..	"	"	"	965	107

## ITALIAN.

By GIO. ANSALDO &amp; Co., Sestri, Ponente.

Name of Vessel.	Built of	Class.	Owners.	G.T. Regis.	H.P. N.
† Guiseppe Garibaldi	Steel	Steam	Foreign	4,476	2,570
* Olga .. ..	"	"	"	197	55
* Neva .. ..	"	"	"	247.50	55

\* Compound. † Triple. ‡ High Pressure.

**The Civil and Mechanical Engineers.**—The opening meeting of the session of the Civil and Mechanical Engineers' Society was held on December 12th, at the Ship Restaurant, Charing Cross, under the presidency of Mr. Sydney à Court, A.M.I.C.E., who delivered his inaugural address as president, and took for his subject "Civil Engineering." After briefly reviewing the development of the science, he dilated more particularly on the necessity of those professing to be civil engineers being properly qualified, and strongly objected to any man who chose being allowed to call himself a "Civil Engineer." He was of opinion that if Parliament thought it necessary that a dentist should have a proper qualification for pulling out or stopping a tooth, that it was still more necessary that an engineer, on whose skill and ability the lives of many depended, should have proper qualifications, and that those who had not should be prevented from advertising themselves and making use of the name of the profession of those who had. Mr. à Court was also of opinion that the civil engineer should have a good general and theoretical, as well as practical education, enabling him to deal in a sound way with the matters that come before him, just as a properly qualified medical man does with the cases that he has to deal with; he also alluded to the advantages of some men becoming specialists in certain branches of the profession, as in the medical and surgical professions. He pointed out the advisability of employing the civil engineer in all large buildings and drew a distinction between the manufacturing engineer and the consulting engineer, and alluded to the advisability of those constructing works and inhabited buildings employing the consulting engineer and not trusting to the cheapest contractor for supplying unchecked the large amount of mechanical apparatus and devices connected with drainage, water supply, heating, lighting and the ventilation of all inhabited structures. A discussion of a most interesting character ensued and was taken part in by the past President, C. T. Walrond, A.M.I.C.E., the Hon. Secretary, E. H. G. Brewster, A.M.I.C.E., M.I.M.E.; R. Booth, M.I.M.E., H. Coward, C.E., William C. Street, F.R.I.B.A., W. M. Binny, and many others.

**The St. Paul.**—The main steam pipe on board the American Line steamer *St. Paul* exploded Wednesday morning, Dec. 18th, the main stop-valve being blown off. Of 40 men who were in the engine-room at the time of the accident, five were killed and six injured. The accident is stated to have been due to a flaw.

**The "Renown."**—Messrs. Maudslay, Sons, & Field, the contractors for the machinery of the *Renown*, line-of-battle ship, have informed the Lords of the Admiralty that, so far as the propelling machinery is concerned, the official speed trials can be commenced immediately. For completing the machinery in advance of the date specified in the contract, Messrs. Maudslay will receive a bonus of £1,500, in addition to the £88,560, the contract price for the boilers, engines, and auxiliary machinery.

## Summary of Shipbuilding Returns of United Kingdom in 1895, arranged in order of Tonnage, built by each Firm.

	Name of Firm.	Place.	No. of Ships.	Total Tonn.
1	Wm. Gray & Co.	Hartlepool	23	63,086
2	Harland & Wolff	Belfast	7	53,098
3	Ropner & Sons	Tees	17	46,443
4	Workman, Clark & Co.	Belfast	11	43,723
5	Wm. Denny & Bros.	Clyde	24	35,028
6	J. & G. Thomson	Clyde	12	32,197
7	Sir Wm. Armstrong, Mitchell & Co.	Tyne	16	30,735
8	Russell & Co.	Clyde	20	29,488
9	Richardson, Duck & Co.	Tees	12	29,214
10	Sir Raylton Dixon & Co.	Tees	10	27,730
11	Palmer's Shipbuilding Co.	Tyne	11	27,440
12	J. L. Thompson & Sons	Wear	13	27,262
13	Scott & Co.	Greenock	12	26,406
14	C. S. Swan & Hunter	Tyne	8	26,223
15	Naval Construction & A. Co	Barrow	8	25,641
16	Furness, Withy & Co.	Hartlepool	9	25,206
17	J. Readhead & Sons	Tyne	10	25,040
18	D. & W. Henderson & Co.	Clyde	28	24,504
19	Charles Connell & Co.	Clyde	9	24,472
20	Fairfield Shipbuilding Co.	Clyde	11	23,024
21	James Laing	Wear	7	21,926
22	London and Glasgow Shipbuilding Co.	Clyde	5	20,440
23	Wm. Doxford & Son, Ltd.	Wear	11	20,299
24	R. & W. Hawthorn, Leslie & Co.	Tyne	8	19,968
25	Caird & Co.	Clyde	4	19,415
26	Short Bros.	Wear	7	19,257
27	A. Stephen & Sons	Clyde	5	16,781
28	Barclay, Curle & Co.	Clyde	7	15,316
29	Wigham Richardson & Co.	Tyne	6	13,593
30	Lobnitz & Co.	Renfrew	12	10,961
31	Tyne Iron Shipbuilding Co.	Tyne	3	10,112
32	A. Rodger & Co.	Clyde	5	9,818
33	A. & J. Inglis	Clyde	7	9,482
34	W. Dobson & Co.	Tyne	9	8,440
35	Earle's Shipbuilding Co.	Humber	12	8,310
36	W. Pickersgill & Sons	Wear	3	7,617
37	Craig, Taylor & Co.	Tees	5	6,626
38	John Priestman & Co.	Wear	2	6,610
39	R. Napier & Sons	Clyde	4	6,600
40	Simons & Co.	Clyde	10	6,600
41	A. McMillan & Sons	Clyde	4	6,560
42	Bartram & Sons	Wear	2	6,438
43	Robert Thompson & Sons	Wear	3	6,198
44	John Scott & Co.	Kinghorn	6	5,581
45	Gourlay Bros.	Dundee	5	5,439
46	Fleming & Ferguson	Paisley	20	5,400
47	T. Turnbull & Son	Whitby	2	5,398
48	R. Williamson & Son	Workington	12	5,108
49	David J. Dunlop & Co.	Clyde	5	5,080
50	Robt. Stephenson & Co., Ltd.	Tyne	10	5,000
51	J. Blumer & Co.	Sunderland	2	4,836
52	Ramage & Ferguson	Leith	8	4,506
53	John Jones & Sons	Mersey	18	4,481
54	Mackie & Thomson	Clyde	12	4,176
55	Cook, Welton & Gemmell	Hull	23	4,068
56	Hall, Russell & Co.	Aberdeen	10	3,998
57	Grangemouth Dockyard Co.	Grangemouth	2	3,958
58	Ailsa Shipbuilding Co.	Troon	6	3,525
59	Cochrane & Cooper	Beverley	25	3,459
60	Osbourne, Graham & Co.	Wear	1	3,398
61	Wm. Hamilton & Co.	Clyde	4	3,257
62	Campbeltown Shipbdg. Co.	Campbeltown	2	3,092
63	Blyth Shipbuilding Co., Ltd.	Blyth	2	3,070
64	John Reid & Co.	Clyde	2	3,033
65	Wood, Skinner & Co.	Tyne	4	2,991
66	Edwards Bros.	Tyne	15	2,876
67	R. Dunsan & Co.	Clyde	4	2,615
68	W. B. Thompson & Co, Ltd.	Dundee	3	2,543
69	Irvine & Co.	Hartlepool	1	2,397
70	Laird Bros.	Mersey	7	2,331

### NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from November 26th to December 21st, 1895:—

- Agnew, J. W., (acting) chief engineer, has been confirmed in the rank of chief engineer in Her Majesty's fleet, with seniority of October 16th, 1892.
- Anderson, John A., assistant engineer to the *Australia*, temporary, to date December 12th.
- Andrew, William J., staff engineer to the *Rupert*, to date December 12th.
- Andrews, Robert W. B., (probationary) assistant engineer to the *Empress of India*, to date December 12th.
- Apps, William R., chief engineer to the *Victory*, additional for the *Bruiser*, to date December 12th.
- Aston, Samuel, chief engineer to the *Pembroke*, additional for the *Scylla*, to date November 25th.
- Ayers, Robert B., engineer to the *Pelican*, additional for re-commission, to date December 12th.
- Barber, J., engineer, R.N.R., has been promoted to the rank of senior engineer.
- Barber, J. (B), engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.
- Barr, E., engineer to the *Royal Sovereign*, to date December 12th.
- Black, W. J., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.
- Black, William J., chief engineer to the *Wildfire*, additional, for the *Dragon*, to date December 11th.
- Blake, Albert V., chief engineer to the *Pallas*, to date January 1st.
- Brown, Thomas F., assistant engineer to the *Majestic*, to date December 12th.
- Burner, W. H., fleet engineer to the *Blake*, to date December 17th.
- Carter, Edwin, engineer to the *Thunderer*, to date December 12th.
- Carter, Edwin, engineer to the *Devastation*, to date December 12th.
- Chase, John E., fleet engineer to the *Royal Sovereign*, to date December 17th.
- Chater, J. D., fleet engineer, has been placed on the retired list of his rank.
- Cocks, Herbert W. L., assistant engineer to the *Jason*, to date January 1st.
- Coleman, Walter, staff engineer to the *Magnificent*, to date December 12th.
- Cook, W., staff engineer, has been advanced to the rank of chief engineer in Her Majesty's fleet.
- Cox, Frank S., assistant engineer to the *Halcyon*, to date December 12th.
- Cranley, James D. W. H. F., assistant engineer to the *Northampton*, temporary, to date December 12th.
- Crawford, William R., (probationary) assistant engineer to the *Empress of India*, to date December 12th.
- Dathan, William A., assistant engineer to the *Partridge*, to date December 12th.
- Davis, William H., fleet engineer to the *Benbow*, to date December 17th.
- Davis, William H., fleet engineer to the *Royal Sovereign*, to date December 17th.
- Dawson, Thomas J., assistant engineer to the *Magnificent*, to date December 12th.
- De Paris, Victor, engineer to the *Empress of India*, to date December 12th.
- Graham, W. J., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.
- Griffin, Daniel, staff engineer to the *Immortalite*, to date November 25th.
- Gregg, C. J., assistant engineer to the *Blenheim*, to date November 25th.
- Gush, Arthur S., (probationary) assistant engineer to the *Resolution*, to date November 30th.
- Hamm, R. S., staff engineer to the *Pembroke*, additional for the *Endymion*, to date December 17th.
- Hart, William, assistant engineer to the *Devastation*, to date December 12th.
- Hart, William, assistant engineer to the *Thunderer*, to date December 12th.
- Hastings, J. F. A., engineer to the *Blake*, to date December 17th.
- Hay, Charles J., engineer to the *Research*, to date December 12th.
- Hills, Alfred, engineer to the *Wildfire*, additional, for the tender *James*, to date December 12th.
- Hird, James, engineer to the *Sybilie*, to date December 30th.
- Ireland, Joseph H. H., engineer to the *Victoria* and *Albert*, additional for the *Alberta*, to date December 11th.
- Kerswell, George T., engineer to the *Magnificent*, to date December 12th.
- Langmaid, Joseph, staff engineer to the *Flora*, to date December 12th.
- Little, Herbert J., engineer to the *Magnificent*, to date December 12th.
- Little, John A., assistant engineer to the *Hawke*, to date December 18th.
- Lock, Henry J., fleet engineer to the *Melampus*, to date December 17th.
- Milton, W., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.
- Moore, Walter L., assistant engineer to the *Majestic*, to date December 12th.
- Moorshead, J. E., assistant engineer to the *Magnificent*, to date December 12th.
- Murray, William H., assistant engineer to the *Basilisk*, to date December 10th.
- Nicholson, James D., fleet engineer to the *Majestic*, to date December 7th.
- Parsons, William G., fleet engineer to the *Empress of India*, to date December 12th.
- Pattison, Alfred R., engineer to the *Majestic*, to date December 12th.
- Purkis, J. T., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.
- Rashbrook, H. S., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.
- Reynolds, H. E. P., engineer to the *Empress of India*, to date December 12th.
- Reynolds, J. A., engineer to the *Basilisk*, to date December 10th.
- Ryan, J., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.
- Sagar, Ernest L., assistant engineer to the *Pallas*, to date January 1st.
- Shorey, Charles E., engineer to the *Wildfire*, additional for the tender *Contest*, to date December 12th.
- Silk, Ethelbert S., engineer to the *Empress of India*, to date December 12th.
- Skinner, William H., fleet engineer to the *Pembroke*, additional for general duties in Medway Reserve, to date December 3rd.
- Smith, F. P., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.
- Smith, Henry F., (probationary) assistant engineer to the *Majestic*, to date December 12th.
- Soper, Edward P., (probationary) assistant engineer to the *Pallas*, to date January 1st.
- Stainton, George H., assistant engineer to the *Malabar*, to date December 4th.
- Stevens, Charles, engineer to the *Australia*, to date December 12th.
- Steward, Cornelius H., staff engineer to the *Wildfire*, additional for the *Sens Pareil*, to date December 17th.
- Swift, Lionel W., assistant engineer to the *Majestic*, to date December 12th.
- Townsend, Walter E., assistant engineer to the *Magnificent*, to date December 12th.
- Vibert, John E., engineer to the *Flora*, to date December 12th.
- Vincent, George H., (probationary) assistant engineer to the *Magnificent*, to date December 12th.
- Williams, Walter H., engineer to the *Victory*, additional for the *Boxer*, to date December 12th.
- Wilson, W. A., engineer to the *Rupert*, to date December 12th.
- Wood, William H., engineer to the *Majestic*, to date December 12th.

**The Ram "Katahdin."**—It is stated that the ram *Katahdin*, built by the Bath Ironworks for the United States Government, will be accepted after all, in spite of her inferior speed, which is attributed to defective design of hull rather than of engines. On her trial she developed several hundred H.P. more than was stipulated for.

## HOAR & BROWN'S HARDWOOD MARKET REPORT, DECEMBER 19th, 1895.

TRAIL:	Timber Loads.	Planks Loads.	Blocks Loads.	Total Loads.
Stock, Nov. 23rd	6,881 ..	2,552 ..	46 ..	9,479
Landings ..	605 ..	66 ..	— ..	671
	7,486 ..	2,618 ..	46 ..	10,150
Deliveries ..	794 ..	112 ..	— ..	906
Stock, Dec. 13th	6,692 ..	2,506 ..	46 ..	9,244

The above figures are taken only to the 13th inst., and so far the deliveries compare rather unfavourably with the average attained last month. The landings have been on a moderate scale.

There appear to be better prospect for this wood in the near future. Prices at port of shipment have become much firmer, and although the quantity of timber here and afloat is very considerable, prices are likely to harden as deliveries take place and floating cargoes are fixed for their several destinations.

Planks are not realizing any better values, in fact sales are reported at extremely low figures, in some cases beating record. Several good Bangkok parcels have lately arrived.

**MAHOGANY.**—Since the late advance of 30 per cent. enquiries have been quiet, the old stock being more or less cleared out. The advanced prices have had the effect of checking any tendency to make large purchases.

Owners of Cuba stock (knowing that supplies have quite ceased until affairs are quiet abroad, and cutters can be induced to again commence felling), have run up the prices to such a high standard that at present there is no chance of business.

It is understood that should the war by any chance terminate shortly, there would be much difficulty in getting any supplies to the coast for at least three to four months after quiet is restored.

**CEDAR.**—The scarcity continues and stocks are exceedingly light. Prices have greatly advanced, and will continue to do so while supplies are unobtainable. Boat building logs are not to be had, and were a consignment to arrive it would meet with an unprecedented reception.

**WALNUT.**—The large accumulations which some little time since made such a display in the timber sheds of the West India Docks are now mostly cleared out, and logs are fetching 25 per cent. in advance of summer values. Stocks are small, but sufficient for present requirements, and large arrivals would quickly remove any prospect of profits for shippers. These remarks apply also to lumber.

**WHITEWOOD** logs and lumber are both doing better. The stocks are not large and the late very low quotations are superseded by fair prices.

**OAK.**—Lumber has been going off well, and some good business has been done both in quartered and plain.

**KAWRIE PINE.**—Not a large but a steady trade is reported. There is sufficient stock to last a considerable time.

**SEQUOIA.**—An improvement is noticeable and a further advance expected as cheaply purchased stocks are consumed.

**GREENHEART.**—The fresh importations are now piled away, and are seen to consist of logs of small dimensions. The price asked is a low one. This port becomes less able every year to cope with the arrivals of greenheart, the demand having almost died out.

## INDUSTRIAL AND TRADE NOTES.

### THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

IT is almost a truism that the prosperity of Glasgow and the West of Scotland is to a large extent bound up in the Clyde shipbuilding industry, and it is regrettable that at this time the industry is in such an unsettled condition. The present unfortunate labour trouble obliterates the somewhat pleasant reflections that might otherwise have been made on the continued progress displayed in the art of marine architecture by Clyde shipbuilders, as evidenced during the year 1895. As in former years, the Clyde stands head and shoulders above all the other centres of industry, the vessels launched in 1895

reaching a tonnage of 360,152, an advance of rather more than 19,000 over 1894. In all, 320 vessels were launched, as compared with 257 the previous year. Ninety-five of the vessels, representing 37,954 tons, were sailing vessels, and 225, measuring 322,198 tons, steamers. The outstanding feature of the past year's work has been Admiralty activity, as evidenced by the launches of the *Terrible*, the *Jupiter*, the *Venus* and the *Diana* for her Majesty's Government. Not only were the construction and launching of these craft a triumph for the private shipbuilder in the domain of naval architecture—a branch of maritime science thought by many to belong to Government departments alone—but a triumph for the principles of his business, as the leading points in the designs of these vessels were borrowed from the best practice of Clyde builders in the construction of fast Atlantic liners. Without exception, these vessels are giving the greatest satisfaction to the Admiralty, and are acknowledged by naval experts to be in many respects superior to those constructed in the Government Dockyards.

From the table given below it will be seen that Messrs. W. Denny & Bros., Dumbarton, head the list with 35,028 tons, as compared with 14,368 tons in 1894. Their total includes two large twin-screw steamers for the Russian Volunteer Fleet, two single-screw steamers of over 5,000 tons each for the British India Steam Navigation Co., and two fast twin-screw steamers for popular cross Channel service. Messrs. Russell & Co., Greenock, who were first in 1894 with 56,965 tons are third on the list with 29,488 tons. Messrs. J. & G. Thomson, Clydebank, who, though actively employed in 1894, were relatively far down in the list, rank second, with a total of 82,197 tons, which includes the first-class cruiser *Terrible*, the first-class battleship *Jupiter*, for the Admiralty, and seven gunboats for the Spanish Government. The construction of the latter was a record for the Clyde. The vessels were required for immediate service in Cuba, and the company contracted to build them in three months. The seven, however, were all completed and through their steam trials in slightly over a couple of months. Messrs. Scott & Co., Greenock, who were tenth in 1894, are now fourth with 26,406 tons; and Messrs. D. & W. Henderson & Co., who were sixth, come fifth in order with 24,504 tons. During the past year the Meadows firm built several first-class yachts from designs by Mr. G. L. Watson, the best known of which were the American Cup Challenger, *Valkyrie III.*, and Mr. Walker's 40-rater *Carees*. Messrs. Charles Connell & Co., Scotstoun, who were second in '94 are sixth, with a total of 24,472 tons; and the Fairfield Co., who followed Messrs. Henderson in 1894, come next with 23,024 tons. The Fairfield Co.'s production includes the *Venus* and *Diana*, two second-class cruisers; the torpedo-boat destroyers, *Handy*, *Hart*, and *Hunter*, and three fast paddle steamers for the Queensborough-Flushing route to the Continent.

The tonnage of each establishment on the Clyde, and how it compares with last year, is shown in the following table:—

	1895. Tons.	1894. Tons.
Wm. Denny & Bros. ....	35,028	14,368
J. & G. Thomson .....	32,197	3,588
Russell & Co. ....	29,488	56,965
Scott & Co. ....	26,406	10,835
D. & W. Henderson .....	24,504	17,043
Connell & Co. ....	24,472	50,556
Fairfield Co. ....	23,024	15,706
London & Glasgow Co. ....	20,440	10,770
Caird & Co. ....	19,415	22,998
A. Stephen & Sons .....	16,731	27,186
Barclay, Curle & Co. ....	15,316	10,390
Lobnitz & Co. ....	10,961	3,125
A. Rodger & Co. ....	9,813	15,625
A. & J. Inglis .....	8,482	7,636
R. Napier & Sons .....	6,600	9,333
Simons & Co. ....	6,600	5,000
A. M'Millan & Son .....	6,560	9,552
Fleming & Ferguson .....	5,400	2,650
D. J. Dunlop & Co. ....	5,080	5,820
Mackie & Thomson .....	4,176	7,115
Ailsa Co. ....	3,525	4,010
W. Hamilton & Co. ....	3,257	17,263
Campbeltown Co. ....	3,092	4,293
John Reid & Co. ....	3,033	5,100
R. Duncan & Co. ....	2,615	4,786
Scott & Sons .....	2,150	3,010
Alley & M'Lellan .....	1,856	—

	1895.	1894.
	Tons.	Tons.
Blackwood & Gordon .....	1,806	1,250
Napier, Shanks & Bell .....	1,793	3,112
Fullarton & Co. ....	1,011	1,600
M'Knight & Co. ....	820	1,602
Murdoch & Murray .....	710	3,092
Hannah, Donald & Wilson .....	560	101
M'Arthur & Co. ....	542	601
Ritchie, Graham & Milne .....	451	1,558
Shearer & Son .....	372	1,023
J. & J. Hay .....	310	200
Fife & Son .....	156	313
Minor firms .....	1,400	1,311
	360,152	340,885

Shipbuilding on the North-east Coast has not made the same progress as on the Clyde. The returns show a considerable decrease in tonnage as compared with the previous year. Forth shipbuilders launched 27 vessels of 13,174 tons, while in 1894 they launched 30 of 15,362 tons. Nine vessels—all steamers—were launched by Dundee shipbuilders, amounting to 8,222 tons, as compared with 8,991 tons in 1894. In Aberdeen 13 vessels in all were launched during the year now ended, the total tonnage being 4,738. Most of the orders were for the supply of fishing vessels, and all the contracts on hand, with one exception, are for the same type of craft.

Coming now to the amount of work on hand on the Clyde, there is close on 225,000 tons, of which 90,000 and 100,000 is in the lower reach, taking Clydebank as the lowest of the upper district establishments. A greater proportion than usual is Government work of the very highest class, and is no more than the measure of the confidence which the Admiralty has by experience learned to place with the firms of the premier shipbuilding river of the world. Side by side with the *Terrible* in Clydebank dock, is the *Jupiter*, one of the largest battleships in the world, and at the close of the past year preparations were being made to begin the construction of the *Europa*, a first-class cruiser of less displacement than the *Terrible*. The *Diadem*, a vessel similar to the *Europa*, is being laid down at Fairfield, where the two second-class cruisers *Venus* and *Diana* were launched and are awaiting the settlement of the Engineers' dispute to be fitted with machinery. Further up the river two cruisers are almost ready for launching at the yard of the London & Glasgow Co., which begins the year with practically 20,000 tons on hand. At Dumbarton, Messrs. Denny & Bros. are building a new vessel to replace the cross-channel steamer *Seaforth*, which was lost some months ago, and there is also on hand a fast paddle boat for service on the Thames. The vessels built recently for the British India Steam Navigation Co., and Messrs. Patrick Henderson & Co., are also to be repeated. The engineering establishment of Messrs. Denny—which is unaffected by the strike of the engineers—is so busy that work is proceeding both day and night. At Messrs. Macmillan & Co.'s only one vessel is on the stocks. Messrs. Blackwood & Gordon, Port-Glasgow, are building a screw-steamer of 1,250 tons and 3,300 I.H.P. for the City of Dublin Steam Packet Co.'s service between Liverpool and Dublin, and a steel paddle steamer for the Mediterranean. Four steamers aggregating nearly 2,000 tons are on hand at Messrs. D. J. Dunlop & Co.'s, and altogether, Port-Glasgow and Greenock are supplied with work which, if not of the highest class, is probably as remunerative.

An analysis of the Clyde marine engineering returns show a considerable improvement over that of the previous year. In 1894, machinery was constructed amounting to 295,620 I.H.P., but the work of the past year amounted to 333,490 I.H.P. and 1,437 N.H.P., an increase of about 40,000. The following is a summary of the work done:—

	1895.	1894.
Firm.	I.H.P.	N.H.P.
J. & G. Thomson .....	50,720	—
Fairfield Co. ....	35,200	—
W. Denny & Co. ....	30,900	—
D. & W. Henderson .....	23,000	—
Dunsmuir & Jackson .....	19,955	—
Scott & Co. ....	18,250	—
London & Glasgow Co. ....	16,800	—
		7,300

	1895.	1894.
	I.H.P.	N.H.P.
Caird & Co. ....	14,200	—
Fleming & Ferguson .....	12,100	—
Muir & Houston .....	11,000	—
A. Stephen & Sons .....	10,785	—
D. Rowan & Son .....	9,350	—
Barclay, Curle & Co. ....	—	1,437
Wm. Simons & Co. ....	8,975	—
A. & J. Inglis .....	8,400	—
Ross & Duncan .....	8,370	—
Lobnitz & Co. ....	7,890	—
Hutson & Son .....	6,200	—
R. Napier & Sons .....	5,700	—
D. J. Dunlop & Co. ....	4,600	—
Rankin & Blackmore .....	4,410	—
Blackwood & Gordon .....	4,170	—
Hall-Brown, Buttery & Co. ....	3,075	—
Alley & M'Lellan .....	2,730	—
John G. Kincaid & Co. ....	2,110	—
Bow, M'Lachlan & Co. ....	—	—
Minor firms .....	15,000	—
	333,490	1,437
		295,620

Comparatively little has occurred during the month to alter the aspect of affairs in connection with the Clyde engineering dispute. About mid-month a conference was held in Glasgow between the employers' and men's representatives, under the presidency of Lord James of Hereford, but, unfortunately, without fulfilling the purpose intended. The employers offered an advance of  $\frac{1}{4}$ d. per hour—1s.  $\frac{1}{4}$ d. per week—to all operatives now receiving less than 7d. an hour, such advance to commence immediately; also a further addition after such advance has been made of another  $\frac{1}{4}$ d. an hour all round, such latter advance to commence on February 3rd next. This offer was refused by the men's representatives, who adhered to their original demands. Subsequently, however, arrangements were made for taking a ballot of all the engineers interested, union and non-union, with the result that the masters' offer was rejected by an overwhelming majority. For all the districts affected the figures stand as follows:—

	For.	Against.	Majority
Glasgow .....	112	1,557	1,445
Greenock .....	42	407	365
Clydebank .....	10	313	303
	164	2,277	2,113

Taking Belfast into consideration, the majority against the masters' proposal totals up to 2,967, as against 189 in their favour. These figures speak for themselves, and show clearly that the men intend to stand firm in their demands. So far the matter stands. As to whether there is going to be an early settlement, or how the unfortunate dispute is likely to end, there is room for much speculation, but, considering the unforeseen climax now reached, we think it advisable not to advance an opinion.

The heavy work in connection with the machinery of the *Terrible* is almost finished, and notwithstanding the cessation of work by the unionist engineers, progress on the whole continues satisfactory. The forty-eight Belleville boilers are practically fitted in position, and the vessel, it is expected, will have steam to turn her engines in the dock by the beginning of the New Year. It was not anticipated that the *Terrible* would be at Portsmouth before midsummer; indeed, the official time of delivery is not until the summer of 1897, but the graving dock now in course of construction there, specially to accommodate her, is being pushed forward as quickly as possible, so as to accommodate her in July next. The *Terrible* must go into dock to be completed, because the Admiralty prefer that in the case of all sheathed and coppered vessels the fitting of the copper bottom should be undertaken in the dockyards. Hence the necessity for her being put into the graving dock before her trial. It is now taken for granted that the *Terrible* will be at Portsmouth before the dock is ready, and arrangements will be made for utilising the new graving dock at Southampton to have this copper bottoming put on before the Portsmouth dock is ready.



The price to be paid for the three first-class cruisers, the orders for which were recently placed with Messrs. Thomson, Clydebank, the Fairfield Co., and the Naval Works & Armaments Co., Barrow, has now been made known. There was a difference of only £4,000 between the highest and lowest prices submitted by the three firms, and perhaps it will be sufficient to give the mean—£481,500. That three firms of such standing should estimate within 1 per cent. of each other is most satisfactory. The fact certainly indicates that the price is regarded as moderately fair, at least, and shows clearly that with improved methods, builders are ready to reduce the cost of production. The price paid for the *Blenheim*, built on the Thames, was £36:13 per ton; for the *Terrible*, Messrs. Thomson got £38 4s.; for the *Powerful* the Barrow establishment will receive £37 14s.; and, as the price for the new boats is £39 4s., it will be seen that there is not much improvement in price since 1893. The improvement is certainly not sufficient to allow so much room as some suppose for increase of wages. There is much greater variation in the price of machinery for the three boats, being from £120,000 to £140,000. Take for comparison what may be regarded as a fair price—£134,000, which is for four-cylinder triple-expansion engines to develop, with natural draught 17,500 I.H.P. This is equal to £8:3 per I.H.P. This is four or five shillings more per I.H.P. than was got for the *Powerful* and *Terrible* machinery, which is almost identical in design. This does not differ much from the rate paid for triple-expansion engines with boilers of the ordinary Scotch tubular type. Instances of such might be multiplied but a few representative cases will suffice. Humphries Tennant, for three battleship engines, for *Royal Sovereign* ships, got £8 exactly; Messrs. Scott, Greenock, for the *Barfleur* got £7 9s.; Fairfield, for the *Edgar's* machinery, was paid £8 5s., so that, whatever be the merits or demerits of the water-boiler, it can scarcely be said that it involves a greater cost for the instances with Scotch boilers quoted are all reckoned on forced draught powers, while the cost per unit of power of the *Terrible*, *Powerful* and *Diadem* (the new cruisers) class is reckoned on natural draught power.

Messrs. James & George Thomson, Clydebank, received instructions during the month, from the Spanish Government, to construct two torpedo-boat destroyers, specially designed for sea-going, and larger and stronger than the boats built and building for our own Navy. Messrs. Thomson have promised delivery of the vessels within a very short period. Indeed, the time guarantee was an important element in deciding the contract, as it is well known Messrs. Thomson have gained great credit in naval circles at Madrid by the rapidity with which they built the seven gunboats for combating the Cuban rebellion, ordered during the Glasgow Fair holiday week and delivered in the stipulated time of 13 weeks. Another point in their favour was the fact that they had also built for the Spanish navy one of the first of the torpedo-boat destroyers modelled on modern lines, and one of the first, if not the first, protective deck high-speed cruiser, which at the time created much interest in our navy and amongst foreign naval constructors, since it demonstrated the comparative advantages of protective deck against a slight armour belt enabling a very much higher speed with the weight saved in armour added to the power of the propelling machinery. The new Spanish destroyers are to steam at sea at a speed of 28 knots, while saving on board 75 tons, so that it may be taken that the speed will be much higher with a less load, as in the case of the 30-knot British boats where the load is only 30 tons. It is probably not necessary to point out that even a slight increase in load and draught considerably affects the speed.

The bulk of the heavy armoured plates to be used in the new warships to be built on the Clyde are to be manufactured by Messrs. Beardmore & Co., Parkhead Forge. Formerly all such orders had of necessity to be placed in Sheffield: but with the Messrs. Beardmore able to roll the heaviest class of plates, and with the prospect of Messrs. Colville & Co., Motherwell, soon being in a position to undertake this class of work, Clyde builders will have no cause to complain of their having frequently to take a second part to the dockyard in the nature of delivery of such material.

Scottish steelmakers owing to the disturbing element of the engineering strike, have had to go further afield—having a lessened outlet for their material—and by quoting rates at a minimum of profit have been successful in securing some fair orders in England. It is a matter of comment that the engineering dispute has not as yet affected the seeming activity of the Scotch steelworks, for in most departments,

machinery is running and few men are being dispensed with. Tube makers, both for marine and land boilers, have been fully engaged during the month, and large foreign consignments have been made. It is satisfactory to learn that bar iron makers have been able to recover a portion of their lost trade in the East carried off by the lower quotations of the Belgians, but now our Indian customers are recognising that the British make is far the superior, and many repeat orders have been secured by Scotch firms. Indeed, all over, the Scotch iron and steelmakers have no reason to complain. Admittedly, they were thrown out of gear by the engineers' dispute, but as before mentioned, by cutting prices they have found a ready market across the Border. The two busiest branches have been the tube makers and the corrugated iron producers.

Sir Andrew Maclean, one of the directors of Messrs. Barclay Curle & Co., shipbuilders and engineers, Whiteinch, was presented during the month with an address and a solid silver casket by his co-directors, officials and foremen, in celebration of the fiftieth year of his connection with the firm. In replying to the donors, Sir Andrew made some interesting remarks about the industry to which he has been so closely related. When he went to Stobcross in 1845, he proceeded to say, shipbuilding was a very different matter from what it is now. A few yards had started the building of iron ships, but the firm of Robert Barclay & Curle continued for seven years after he joined them to build only wooden vessels. It was only after the late Mr. Ferguson became manager in 1852, that they commenced iron shipbuilding. At that time, if they built one vessel of 500 tons in the course of a year they thought they had done very well; in fact, it was as much as they could turn out. Their first large ship was the *Ormelie*, which was about 506 tons, and so narrow was the channel when she was launched, that they had to lay down logs on the opposite side of the river, and to erect a barricade round the stern, in order to prevent her running into the bank. From this we can readily understand the great development which has taken place on the Clyde during the past fifty years.

Messrs. R. & A. Macdonald, the Clydebank electrical engineers, who recently created some stir in the electrical world with the announcement that they had discovered a greatly improved and cheapened method of generating electricity, in which such humble materials as salt water and cinders played a notable part, have been experimenting with their electric launch on the Clyde, sailing from Glasgow to Greenock by way of having a trial trip. Everything passed off very successfully and the electricians were highly pleased with their efforts. The boat, which is 16 ft. long, with a 4 ft. beam, was propelled by power transmitted from the motor to the propelling shaft by means of ordinary spur gearing. The motor requires 45 volts and 25 amperes, which, it is said, obtained 300 revolutions of the propeller per minute. It is the aim of the inventors to propel in this way vessels of any size across the Atlantic. There does not seem to be anything inherently improbable in the idea, after witnessing our "wooden walls" give place to iron vessels, and the again to huge engineering shops afloat, we are prepared for almost anything.

In the midst of the chaotic condition of things at present pervading the Clyde, it is distinctly refreshing to report that arrangements are in progress for the establishment of new shipbuilding and engineering works on the upper reaches of the river. It is understood that the works will be the largest of the kind in the United Kingdom, and will be under the management of gentlemen of experience and of recognised standing in their respective departments. Meanwhile, arrangements are being carried out as expeditiously as possible. Between the shipbuilding and marine engineering departments the new firm will employ an exceedingly large number of men.

Mr. Alex. Gracie has been appointed engineering manager to the Fairfield Shipbuilding and Engineering Co., Limited, in place of Mr. Laing, who it may be remembered resigned his position recently. Mr. Gracie hails from the world-renowned yard of Messrs. James & George Thomson, Limited, Clydebank, a fact which in some measure carries its own recommendation. He is a thorough engineer, and deservedly popular. It is expected and hoped that his appointment to the managership of the great Fairfield company will be contemporaneous with a settlement of the present disagreeable labour dispute.

Messrs. William Simons & Co., Limited, Renfrew, booked an

order from the Agent-General of the West Australian Government early in the month, to construct a powerful hopper-dredger for work at Freemantle, this being the second vessel of the kind ordered by the Government from this firm. The firm of Messrs. Lobnitz & Co., shipbuilders, of the same port, has been converted into a limited liability company with a capital of £160,000.

Messrs. William Denny & Bros., engineers and shipbuilders, Dumbarton, received instructions early in the month to build and engine a large steamer for the British-India Steam Navigation Co., a repeat of the *Okara*, recently completed by Messrs. Denny for the same owners. The same firm of builders likewise booked an order during the month to build a duplicate of the *Rome*, constructed some time ago by Messrs. Denny to the order of Messrs. Patrick Henderson & Co., Glasgow.

Messrs. Caird & Co., shipbuilders, Greenock, booked an order in the early part of the month to build a twin-screw steamer of 3,000 tons register, for the mail and passenger service between Panama and Valparaiso. The vessel, which is to the order of the Pacific Steam Navigation Co., is to be a duplicate of the one which Messrs. Caird & Co. have at present on the stocks for the same company.

Messrs. Blackwood & Gordon, engineers and shipbuilders, Port-Glasgow, secured an order early in the month to build a steel paddle steamer of 160 tons gross register, for trading purposes on the Mediterranean. The vessel will be engined by the builders and will be of 450 I.H.P.

## TRADE NOTES FROM THE TYNE, WEAR, TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

### THE TYNE.

IN reviewing the shipbuilding industry in 1895, we are constrained to note the unpleasant fact that there has been retrogression. The output of tonnage at most of the leading centres, has diminished, as compared with that of 1894, and though the diminution is not large, it is sufficient to denote that the year has not been a prosperous one, either for builders or the great army of workers who are dependent upon the industry for a livelihood. During the year there was every temptation for shipowners to speculate, if they cared to ignore existing dulness, and provide against a possible increase of trade in the future. But the speculative spirit does not seem to have flourished much lately, and though prices reached a point which practically blotted out all possibility of profit for the builders, no disposition was shown by shipowners to avail themselves of the advantage offered, excepting so far as concerned the fulfilment of immediate requirements. This restraint on the part of shipowners, who were in no way checked for lack of capital, will probably be the wiser policy in the long run, and though it is to some extent accountable for restricted output in the year just passed, it will have the effect of accentuating the trade revival when it comes.

The proportion of foreign orders coming into the hands of shipbuilders in this district during 1895 is less than in former years, a circumstance which, perhaps, is to be accounted for by the further development of the shipbuilding industry on the continent. There cannot be the slightest doubt that German builders are putting forth strenuous efforts to get on terms of equality in the matter of productive resource with the builders of the United Kingdom, and the fact that they have in the past twelve months succeeded in keeping a large quantity of work at home shows that they are making headway. The arrangement of their yards is founded upon English models, and the machinery equipment of such establishments usually leaves nothing to be desired. They are also greatly advantaged by a practical immunity from strikes, as well as from the crippling influence of trade union domination. Endowed with these advantages and animated by the genuine spirit of competitive ambition, these foreign shipbuilding and engineering firms are likely to become dangerous rivals, and it behoves all connected with the industry in this country to look the situation in the face, and try to formulate some definite course of action with a view to the better conservation of home trade interests.

The building of war vessels formed a considerable item in the

trade of the Tyne in the year under notice, there being no less than eight torpedo destroyers—each having a registered tonnage of about 300, and an I.H.P. of 4,000—turned out from three of the leading yards. Some of these have been delivered to the Admiralty representatives, and have gone through their official trials with most gratifying success. A powerful cruiser the *Buenos Aires*—also figures in the year's returns of output, and in this case also the first trials have resulted most creditably to the builders. Boats of a special class have constituted a prominent feature in the year's production of Tyneside yards. Among these may be mentioned the *Borneo*, built by the Palmer's Shipbuilding and Iron Co., Limited, for the P. & O. Co.; the *Kherson*, built by Messrs. Hawthorn, Leslie & Co. for the Russian Volunteer Fleet; the *Westmeath*, built by Messrs. C. S. Swan & Hunter, for Messrs. Hudson & Co., of Sunderland; the *Goldensfels*, built by Messrs. Wigham Richardson & Co. for the Hansa Co., Bremen; and the *Auricle* (oilship), built by the Tyne Shipbuilding Co. for Messrs. Hunting & Son, Newcastle. All these vessels are splendid specimens of their respective classes, and reflect the highest credit upon the builders.

To show that Tyne builders are fully alive to the necessity of keeping pace with the times, it need only be stated that changes in methods of working have been initiated which must have an important bearing on the future of shipbuilding. The principal of these changes is the application of electrical power to the difficult work of hoisting material into position on vessels in course of construction. In their efforts to attain the highest economical results, shipbuilders have of late years found it expedient to adopt larger sizes of plates and bars than had been previously in use, and the vastly increased labour involved in fixing these structural parts has made it more necessary that some more effective force should be employed than could be obtained from human sinews. Steam and hydraulic power have been used with considerable success, but electricity now bids fair to out-distance these aids to muscular strength in the heavier departments of ship construction.

The year has not passed without a number of vexatious strikes which, though primarily confined to one section of men, have caused great numbers of others to be laid idle for many weeks, and which have undoubtedly gone far to lessen the output and, possibly, curtail the amount of work that might be available in the near future. The most recent of these strikes has now been happily settled, and we are pleased to note that in effecting the settlement the principle of arbitration has been brought into requisition. The damage that has been inflicted will be amply atoned for if the adoption of the principle in this instance lead to its employment in future cases of difference; or better still, if it lead to the establishment of a permanent board of conciliation and arbitration for the shipbuilding trade of the district.

To give an idea of the relative state of business during the year at the different centres of the north-east coast, we may state that the Tyne output in 1895 was less by 16,616 tons than the output of 1894, while on the Wear the decrease, as compared with the previous year, reached the larger figure of 22,537 tons. The Hartlepoons on the other hand have increased the output in 1895 by the substantial figure of 11,676 tons, while on the Tees a still larger increase is shown, the amount in this case being 14,638 tons. As a matter of fact, the Tees yards have exhibited quite exceptional prosperity in 1895, and have only been busier in two other years since 1882. The same remark applies with equal force to the Hartlepoons, where the output of the year just closed has only been exceeded on two occasions (if we except a trifling excess of 55 tons in 1892) namely, 1890 and 1891.

On the Tyne, the firm of Sir W. G. Armstrong, Mitchell & Co., with a yard at Elswick and another at Low Walker, head the list in the output returns of 1895, their total production being 30,735 tons. The post of honour on the Wear is held by Messrs. J. L. Thompson & Sons, who gained that enviable distinction eleven years ago, and have retained it ever since. The output total of 63,086 tons, achieved by Messrs. Sir William Gray & Co., is not likely to have been reached by any other firm in the Kingdom, and though at the moment we cannot positively affirm the fact, we are strongly inclined to think that this firm will again hold the world's record, so far as regards the output of tonnage.

**Tyne Shipyards.**—The opening of the year 1896 finds the Elswick establishment of Messrs. Armstrong, Mitchell & Co.

in a more satisfactory position as regards present and prospective work engagements than existed at the beginning of 1895, and no departure from a condition of exceptional briskness is likely to be experienced during the coming twelve months. At the company's Low Walker yard the change for the better is not so marked; but in this case also there is reason to expect the advent of a brisker time very shortly.

Messrs. Hawthorn, Leslie & Co., will be enabled to begin the year most auspiciously, having secured some further orders of importance, since last month. Among these may be mentioned three vessels for the Russian Steam Navigation Co., intended for the Black Sea trade. The firm have also been commissioned to build two exceptionally large steamers for a firm of local ship-owners, and are reported to have as much work contracted for as will last them the whole of the year.

Messrs. C. S. Swan & Hunter have received from the Pacific Steam Navigation Co. an order for a vessel of an important class, and as the berths in both their east and west yards are fully occupied, a tolerably busy time is assured during the next few months.

The fact that for several weeks past the progress of operations had been interrupted by trade disputes, will no doubt have its influence in stimulating prospective activity.

Messrs. Wigham Richardson & Co. have also booked orders lately, among them being one or two for foreign owners. The firm have already built a number of vessels for the same owners, all of which have given the utmost satisfaction in actual work. At present their building berths are well occupied.

The Palmer Co. are reported to have secured an order for two superior type boats to be employed in the North Sea trade. They have also just received an order from the Admiralty for two 30-knot torpedo boats. This is a well-merited recognition of the satisfactory manner in which the company have executed previous Government contracts.

A commencement has been made with the construction of the Hamburg-South American liners, mentioned in our report last month, and the state of work in the yard has consequently much improved. It is stated that a very large proportion of the interior fittings and general accessories, for these vessels, are being manufactured in Germany.

Messrs. John Readhead & Sons, who have kept well up in the output returns for last, as well as many previous years, are well supplied with orders, and all their building berths are engaged. The dry dock and repairing department have been kept well employed throughout the year, and there are at present one or two good contracts in hand.

The Tyne Shipbuilding Co. have a good share of work in progress, and at Messrs. Dobson & Co.'s yard considerable activity exists. Quietude prevails at two other establishments, and four yards remain absolutely idle. A statement, however, has gone the rounds of the local press that the largest of these derelict yards is about to be re-opened for work, but as similar statements have been circulated on former occasions and have turned out to be unfounded, we are disposed to postpone acceptance of the present statement until further confirmation is to hand. Messrs. J. & T. Eltringham & Co., South Shields, have built five small vessels during the year, and have fitted ten steamers with new boilers, the boilers in two instances having been shipped out to Constantinople to be placed in the steamers for which they were ordered at that port. The firm have also done a good deal of repair and alteration work to marine engines, and have constructed a pair of dock gates for a large graving dock and a kyanizing cylinder for preservative treatment of large timber.

**Engineering.**—The output of marine engines and boilers from Tyneside engineering establishments in 1895 is larger than might have been expected considering the decrease in tonnage launched. At the Wallsend Slipway Works the number of vessels engined was 17, the total I.H.P. being 29,260. Five of the vessels were fitted with their second equipment of machinery, having been launched a good many years ago, and of the remaining vessels, two had duplicate engines, and one, being a paddle boat, had engines of the oscillating type.

The North-Eastern Marine Engineering Co. have engined at their Wallsend Works 12 new vessels (two of them being twin-screw), and have renewed or altered the machinery of five others, the total I.H.P. of the engines dealt with being 19,350. At the Sunderland works they have turned out the machinery for fifteen vessels aggregating an I.H.P. of 8,080, besides fitting boilers

in three other vessels. The total I.H.P. of engines manufactured by the company at Wallsend and Sunderland reached the large figure of 27,430. Excellent results have been obtained in the instances where compound engines were converted to triple, and the company have now a number of similar contracts to execute.

Messrs. Hawthorn, Leslie & Co., have had a very busy year at their St. Peter's works, and the briskness is likely to be continued for some months yet. The Palmer Co., the Neptune Co., and Messrs. Readhead have supplied the machinery to all the vessels built by them.

Messrs. Baird & Barnsley, of North Shields engined four vessels during the year, the engines representing a total I.H.P. of over 1,000. Messrs. Hedley & Boyd engined three vessels of 617 I.H.P.

Messrs. H. Watson & Sons, of High Bridge Works and Walker Gate, have, towards the close of the year, secured a large amount of high-class work for war and passenger steamers. The firm have lately commenced the manufacture of the new type of pumping engine (the invention of Mr. James Patterson, of Walker) which is specially adapted for high pressure boiler feeding on the automatic principle. A good many orders have already been booked for this type of pump, and a large sale is anticipated. The firm have introduced a new bronze alloy named the "Atlas," intended as a material for the manufacture of propellers, and upwards of 30 vessels of from 10,000 tons downwards, have been supplied during the year.

The Ouseburn branch of Messrs. John Spencer & Sons' works are just now showing exceptional briskness, and there are orders enough in hand for ship and engine forgings to ensure a continuance of the present activity well into the summer.

#### THE WEAR.

**Shipbuilding.**—Messrs. Short Bros., who hold fourth place in the output returns this year, with a total product of 19,257 tons, will commence the New Year with excellent prospects, there being a good number of orders on their books. Though there are three firms having larger outputs in the present returns, the excess in two instances is but trifling, and if Messrs. Short Bros. had been under the necessity of putting into the water vessels that are now standing completed on the stock, they would have occupied second place instead of fourth. Early in the year, the firm launched the fine passenger steamer *Tartar Prince*, which has been added to the fleet of the Prince Steam Shipping Co. This vessel, which is most handsomely fitted out, will always be an object of interest on account of having on her first return voyage to this country, brought back for trial the notorious Jabez Balfour. A special interest also attaches to two other vessels built by the firm in 1895, namely, the *Colonel J. T. North* and the *Avery Hill*. These we believe were the first steamers ordered for employment in the nitrate trade, and they are now on their way out to the West Coast of America to load nitrates. The firm make a special feature of repair and reclassing of old vessels, and have, during the past twelve months, got through a lot of work in this line.

Excepting the two torpedo destroyers *Haughty* and *Hardy*, the vessels launched by Messrs. Doxford in the past year have all been of the "turret" type. The firm are well booked forward for vessels of this type, which to all appearance has come to stay. One of the most successful local ship-owning firms have adopted the design for their later additions to the well-known fleet of steamers under their control, and are evidently well satisfied with the results of the new departure. The system of "joggle" plating, to dispense with packing, which has been introduced by the firm within the year, has also turned out a distinct success, and though other shipbuilders are slow to adopt so advantageous an arrangement—which lessens weight without diminishing strength—not to speak of the numerous other aids to economical working afforded by it, there is not the least reason to doubt that its general employment in shipbuilding is certain to be realised in the future.

The mammoth plate bending rolls, which have lately been added to the machinery equipment of Mr. Laing's yard, are now in working order, and have turned out to be a most important acquisition. A number of old machines of various kinds have been dispensed with at this establishment lately, and will be replaced by others of more modern type. The intention of the management appears to be the gradual substitution of "up-to-date" machinery for everything which might be regarded, as in the least degree cumbrous or ineffective. Much has already

been done in the direction indicated, and it is probable that by the end of another year the whole of the machinery equipments in both the east and west yards will have been renewed.

Messrs. Pickersgill have booked some orders lately, and Messrs. John Priestman & Co. have also added to the number of their current contracts. Among the latter is an order from a Glasgow firm for a vessel of the "self-trimmer" type, which has been patented and introduced by Messrs. Priestman. Messrs. R. Thompson & Sons have only one small vessel on the stocks, which is yet in an early stage of construction, and Messrs. Osborne & Graham have had very little work in hand for some months past. There is now on the stocks and ready for launching, a vessel of 3,000 tons burden (or approaching thereto), which is understood to be unsold.

At the yard of Messrs. S. P. Austin & Son, the new work dealt with during the last twelve months has been small in quantity, and only one vessel has been removed from the building berths to the water. This was of moderate tonnage, but they have now on the stocks three vessels of larger size, two of which are in advanced stages of construction. The firm are at present carrying out a very extensive repair contract—involving almost complete renewal of the hull up to the bilges—on a vessel in the graving dock, and it is understood that other contracts are being negotiated for. The firm having re-arranged and extended their yard with a view to increase the productive capacity, may be expected to take a higher position in future output lists when trade regains the normal condition of activity.

The Sunderland Shipbuilding Co.'s yard is presenting a fairly satisfactory appearance at the close of the year, the vessel ordered by Mr. Wm. Lund for the Australian trade, being already well-advanced in framing, and the other vessels on the stocks being in various stage of construction. Messrs. Bartram & Sons, who have materially added to their productive resources this year by extensions of premises and additions to plant, have two vessels well advanced towards completion on the stocks, and are understood to have booked orders for other vessels which will be laid down later on. Considerable slackness has existed at Messrs. Blumer & Co.'s yard throughout the greater part of the year in spite of the fact that three building berths have been almost constantly occupied. There is at present little doing at the yard, but it is hoped that matters may improve in the course of the coming spring. The Strand Shipbuilding Co. have done a good deal of repair work lately, and have on the stocks one new vessel, i.e., a light ship ordered by the Trinity House.

Messrs. J. L. Thompson and Sons, Limited, of the North Sands Yard, have all their berths occupied, and have besides a good deal of work in reserve. The first of two large vessels building for the Rickmers' Co., of Hamburg, is nearly ready for launching, and the second will be put off the stocks before midsummer. For some time past the firm have been disposed to prefer gas engines to steam engines for driving machinery in the yard, and have recently put down very large engines of this type not only at the shipyard, but also at the Sunderland Forge, which is their property. As further showing their confidence in this medium, they have within the past few days ordered two additional gas engines having a total brake power of 250 H.P. Mr. Marr, the general manager (who, it may be added, is also a partner in the firm), has in a letter to the local press, stated his decided preference for gas as against steam, as a motive force in shipbuilding and engineering works. As such an opinion must necessarily carry with it great weight, we shall expect to see considerable acceleration in the exodus of the steam motor from works of the description named. In addition to the large quantity of new work turned out by the firm in the past twelve months, they have carried out more or less extensive repairs on over 50 steamers.

**Engineering.**—In the principal marine engineering works of Sunderland, business in 1895 has been fairly satisfactory. Messrs. George Clark, Limited, head the list in the matter of output with an I.H.P. of 24,160; Messrs. John Dickinson and Sons coming very close to this figure, with 23,400 I.H.P.; the number of engines manufactured being the same in both cases. Messrs. William Duxford & Sons engined twelve vessels, the total I.H.P. being 18,710. Two of the vessels—the *Turret Crown* and *Turret Cape*—were fitted with water-tube boilers of the Babcock & Wilcox type, and we understand that the experiment has proved successful. These were the first merchant vessels fitted with water-tube boilers in the district of the Tyne and Wear. The North Eastern Marine Engineering Co. engined 15 vessels, but all excepting three were of small size, and the aggregate

power was consequently small as compared with the output of the other firms mentioned. The three vessels which had engines of comparatively larger power, were built at Middlesbrough, and were of very superior design and construction. Messrs. William Allan & Co., engined seven vessels, having a total N.H.P. of 1,630. The Wreath Quay Engine Works, belonging to the newly-formed firm Messrs. Jameson & MacColl, have been started during the twelve months, but though there is marine work now in progress at the establishment, no output has as yet been reported.

Owing to an important purchase by Messrs. J. L. Thompson & Sons, the works which for many years have been carried on by Messrs. Welford Bros., engineers, &c., have been added to the Sunderland Forge premises, which they adjoin. The whole will now make one very extensive and complete establishment, in which new branches of engineering work will be commenced as soon as arrangements can be made. The Forge works will, of course, be carried on as hitherto, but on a considerably extended scale.

**The Hartlepool.**—Notwithstanding the extraordinarily large output of tonnage from Messrs. Sir Wm. Gray & Co.'s yards during the year just past, there remains a very considerable amount of work to be dealt with, and both frame-turning departments and outside departments are kept busy. Messrs. Furness & Withy are also very well off for work, and it is understood that the prospect at Messrs. Irvine & Co.'s yard is by no means discouraging. All these firms have had repair contracts during the year, but the first named, as having the largest resources, obtained the bulk of the more important contracts. The output of work at the Central Marine Engine Works in 1895 has been most satisfactory, the number of vessels engined being 24, the aggregate power reaching the large figure of 84,000 I.H.P. Some important alteration work has been done in addition, and there cannot be a doubt that, on the whole, the result of the year's working will favourably compare with that of almost any other engineering establishment in the country.

The Hartlepool engine works have been fairly well employed during the past year, and we understand that the outlook for the coming year is good despite the fact that prices are still unremunerative.

**Stockton.**—The shipbuilding yards at this centre still present an appearance of briskness, and there seems to be every likelihood that the large production of the past year will be equalled—or at all events run very close—in the year that is to come. The establishment of Messrs. Craig, Taylor & Co. is daily showing more animation in the various departments, and it is tolerably certain that after the "turn of the year" a very near approach to the old state of activity will be attained. Messrs. Blair & Co. have had a pretty busy year, and as there are still some good orders in hand, the early months of the coming year are likely to show a continuance of steady trade. The Stockton Forge Co. are tolerably well off for orders, and at several foundries business shows improvement. The Imperial Boiler Works, and also the boiler works of Messrs. Riley Bros., continue in active operation, the latter establishment being quite as full of work—mainly donkey boilers of the marine type—as the enterprising proprietors could wish. At most of the steel and iron works improved business is noticeable, and in some cases there are as many orders on the books as can conveniently be dealt with.

**Middlesbrough.**—The state of business at the yard of Sir Raylton Dixon & Co. is such at the close of the year as to indicate the probability of steady work being continued throughout the different departments during at least the first half of the year we are entering upon. The firm have turned out some very large vessels during the year, the largest being the s.s. *Cavour*, of 4,920 tons, gross tonnage. Messrs. Craggs & Son have only had a small output of new work this year, but they have been continuously employed upon alteration and repair contracts, including the lengthening of the s.s. *Teesdale*, which was a contract involving the employment of a very large amount of new material. They have been very fortunate in booking orders recently for both new and repair work, and are likely to be busy in both lines throughout the coming year. Messrs. W. Harkess & Sons have launched two vessels during the year the total carrying capacity of which was 1,000 tons. The firm have satisfactory prospects for 1896. The engineering firms are generally showing signs of increasing work, and in the iron foundries business is decidedly much improved. Boiler and bridge works are for the most part only moderately well employed, and in the docks con-

siderable slackness exists. There continues to be a fair demand for steel ship-plates and angles, but iron is very little sought after. Prices are as follows:—Steel ship plates per ton, £5; steel angles, £4 15s.; iron ship plates, £4 15s.; common bars, £4 17s. 6d.—all less 2½ per cent.; steel rails, £4 15s. net. The coke trade is firm, the price per ton delivered being 13s. 8d.

**Darlington.**—An improved demand on account of foreign railway companies has caused an increase of enquiries at works devoted to the manufacture of railway material, and, it is hoped, will result in contracts being placed. The Darlington Forge Co.'s works continue to be well employed in all departments, and it is understood that the New Year holiday period will be unusually short. There is every prospect that the company's operations in the coming year will be as successful as in the year just past, which, in spite of the comparatively dull state of trade prevailing generally, was in this case one of excellent results, both as regards the importance of the contracts, and the quantity of work turned out.

### THE MERSEY.

(From our own Correspondent.)

IN connection with the general shipbuilding and marine engineering trades of this district the only matters of special moment to notice during the past month are that Messrs. Laird Bros., of Birkenhead, are making good progress with the new Holyhead mail boats to which we have previously referred, the first being already plated and the second one in frame. They also expect to have steam on the first of the new lot of 30-knot torpedo destroyers very soon. The firm is pushing rapidly forward the construction of H.M. first-class battleship *Mars*, and it is expected that the vessel will be floated in March, the official order for the ship having been received by the firm in March, 1894, the keel being laid on the 2nd June following, so that the work of construction has made satisfactory progress, although considerable delay has been experienced in the delivery of the armour plates. But for this inconvenience the *Mars* would have been much further advanced. By the time she is floated, however, all her boilers will be on board, and her engines and principal machinery in position, whilst she will also have received her broadside armour. The vessel will be similar to the *Majestic* and *Magnificent* just commissioned, but it may be added that these vessels were put in hand several months before the order to Messrs. Laird was given.

In the shipbuilding industry on the Mersey there has been a continued decline, so far as the Liverpool side is concerned, the following returns showing that work of any importance has been confined almost entirely to the Birkenhead side, where there has been a large weight of work coming forward during the last five or six months, which has perhaps exceeded in importance and quantity the orders that have been booked for several years past. On the Liverpool side, most of the work secured has been in completing small vessels, tugs, barges, &c., and repairs, re-boiling and conversions, in which there has been a fair amount doing. Messrs. John Jones & Sons report a good deal of work of a small kind, including two steel caissons, of a tonnage of 1,500, and sixteen small steamers and barges for foreign owners, two being twin-screw, ten sailers, three paddle and one single-screw, with tonnages up to 450. Messrs. Clover, Clayton & Co. have built no vessels at all, whilst repair work has been below the average. Messrs. D. Rollo & Sons have put new boilers into a number of steamers, and done some heavy repair work, and have at present some small sets of engines and boilers in hand. Messrs. H. & C. Grayson, Limited., have dry-docked about 800 vessels, steam and sail, and have had a considerable amount of repair work to hulls, engines and boilers of large vessels. Messrs. Thomas Royden & Co., and Messrs. Gilchrist & Co. have built no new vessels, but the latter firm have orders in hand for three light draft steel screw tugs, to be completed during the present month; and Messrs. James Harland & Co. have turned out only one vessel, the *Merlin*, a wooden screw steamer of 260 tons, for carrying limestone. On the Birkenhead side, Messrs. Laird Bros. have, during the year, completed four twin-screw high-speed vessels for the Navy, *Sparrowhawk*, *Quail*, *Virago* and *Thrasher*, each of 220 tons and 6,000 I.H.P.; a screw steamer of 240 tons and 480 H.P. for foreign owners; a paddle steamer, *Queen of the North*, of 600 tons and 1,760 H.P., for British owners; a steel-screw steamer of 111 tons and 50 H.P., for a foreign firm; and have

converted the Great Western Railway Co.'s steamer *Pembroke* from paddle to twin-screw, with new engines and boilers of 3,300 H.P.

In marine and general engineering the position has shown a decided improvement during the year. Amongst marine engineers there has been considerably increased activity, although during the last few months the completion of a good deal of new work has necessarily been held in abeyance, pending settlement of the shipbuilding dispute on the Clyde and at a Belfast. With regard to general engineers, the position at the opening of the year was anything but encouraging, works as a rule being short of orders, with the unemployed returns considerably above the average, the Amalgamated Society of Engineers having from nine to ten per cent., and the Steam Engine Makers' Society 5½ per cent. of the local membership on donation benefit. Early in the year, however, prospects began to brighten, and a slow but steady improvement set in. For the first few months, however, business continued of only moderate dimensions, except that some good foreign orders were secured, but with the opening of the second half of the year, the improvement became more pronounced, a large weight of new work coming forward, and the unemployed list of the various trades union organizations showed a steady decrease, until in August the returns of the Amalgamated Society of Engineers had got down to 5 per cent., and the Steam Engine Makers' Society to about 3 per cent. of the membership. This increased activity, however, scarcely went beyond filling up the order books of engineers, who had previously been extremely short of work, and no appreciably better prices were obtainable, whilst towards the close of the year there was a slackening off in new enquiries coming forward, the protracted shipbuilding dispute having a further indirect depressing tendency. The year closes, however, with a generally hopeful tone, the leading engineering firms being mostly well supplied with work, stationary engine builders, both in the light and heavy departments being exceptionally well booked, whilst locomotive builders, who have for a considerable time past been but very indifferently employed, have in some cases booked work which will keep them fully employed over the next six or twelve months. Machine tool makers and machinists are also well supplied with orders, and boiler-makers are generally fairly employed. The unemployed returns of the trades union societies, which are a fairly good indication of the industrial position, are also satisfactory, the steady decrease of unemployed members being well maintained, the number in receipt of out-of-work benefit in both the Amalgamated Engineers' and Steam Engine Makers' Societies being with the close of the year not more than half what it was at the end of 1894, and less than it has been for the last four years.

The iron trade opened the year with very unsatisfactory prospects as to the future. The downward movement in prices which marked the close of the previous year continued without bringing forward any increased business, owing largely to the depression in the principal iron-using industries. An extremely slow demand, with an easy tendency in prices, was the general report as regards all descriptions of raw material. Local pig-iron makers were quoting about 41s. for forge to 44s. 6d. for foundry, less 2½ delivered equal to Manchester, but were quite out of the market at these figures; Lincolnshire makers were asking 87s. for forge to 88s. for foundry, net cash; and Derbyshire makers 43s. to 44s. net cash, as their minimum for delivery equal to Manchester, but business at these figures was impracticable, as there were lower sellers in the market. Outside brands were quoted by makers at about 43s. 10d. net cash for Middlesbrough, delivered Manchester; with Eglinton 46s. 3d. to 46s. 6d.; and Glengarnock 47s. to 47s. 6d. net prompt cash, delivered Lancashire ports, with merchants underselling 3d. to 6d. per ton. This depressed condition continued all through the first three months of the year, and prices got down to about 42s. for Lancashire foundry; 42s. 6d. for Derbyshire foundry; 36s. to 38s. for Lincolnshire forge and foundry; 43s. 4d. for foundry Middlesbrough, delivered Manchester; and 45s. for Eglinton and Glengarnock delivered Lancashire ports. With these excessively low figures, buyers gradually came to the conclusion that the market had at length touched the bottom, and during April a considerable weight of business came forward, with the result that prices began to harden. Buyers, however, soon showed a disposition to hold back rather than pay the advanced rates. This resulted in another spell of very quiet business with renewed underselling amongst merchants and dealers. With the close of the half-year, however, there were indications of returning activity.



enquiries coming forward more freely, and although these were based at under makers full rates, concessions were not easily obtained. Makers gradually began to harden up in their prices, whilst the weight of buying went on steadily increasing. This improvement in trade continued without interruption, except for occasional fluctuations in prices caused chiefly by speculative operations in outside brands, until well on towards the close of the year, prices getting up to 46s., less 2½ for No. 3 foundry, Lancashire; 46s. 6d. to 47s. 6d. net cash, for Derbyshire foundry; 41s. 6d. for forge, to 43s. 6d. and 44s. for foundry, Lincolnshire, net cash; 47s. 4d. for Middlesbrough, net, delivered Manchester; with Eglinton and Glengarnock about 49s. 6d. to 50s. net, prompt cash, delivered Lancashire ports. The heavy buying that had been going on gradually filled up the requirements of consumers, many of whom covered themselves well in advance, whilst some of the merchants and dealers bought largely on speculation, and as a natural result this exceptional activity was followed by a lull, whilst the shipbuilding dispute also operated as a check upon further buying of any great weight. For the remainder of the year the business put through was only of very moderate dimensions, with a good deal of under-selling on the part of merchants, the bulk of the business done being secured by low second-hand sellers, who had either bought before the rise, or were prepared to speculate upon a possible fall in prices. Makers, however, were so fully sold over several months ahead that they were not only independent about securing further business, but indifferent about entertaining enquiries for forward delivery, of which there were a good many in the market, and the low selling had no appreciable effect upon makers' quoted list rates, which, with the close of the year, except for a giving way in some of the Scotch and Middlesbrough brands, remain practically unchanged.

In finished iron makers commenced the year short of orders, and with prices generally weak on the basis of £5 5s. for Lancashire to £5 7s. 6d. for Staffordshire bars; £6 15s. to £7 for sheets; and £5 15s. for random, to £6 for special cut lengths of hoops, delivered Manchester district. There were indications of a slight improvement during the earlier part of the year, but these were only temporary, and business again quickly fell off, most of the forges barely running more than half time, and prices gradually gave way until both Lancashire and North Staffordshire bars got down to £5 per ton; sheets to £6 12s. 6d.; and hoop makers, to meet foreign competition, had to reduce their shipping prices 2s. 6d. per ton. As in the case of raw material these low prices were followed by a steady increasing weight of buying, not only on home accounts, but also for export, a very noticeable feature being the reappearance on the market of American orders for hoops, in which no business whatever had been done with the United States for the previous three or four years. Forges gradually got into full time, and prices all round began to move upwards by advances of 2s. 6d. per ton, until in October hoops were quoted £6 2s. 6d. for random to £6 7s. 6d. for special cut lengths, with 2s. 6d. less for shipment, whilst bars had advanced to £5 10s. for Lancashire and £5 15s. for North Staffordshire qualities; and sheets, for which there had been a largely increased demand, especially for export, got up to £7 12s. 6d. per ton, delivered Manchester district. This advance in prices had no appreciable effect in checking the demand, except as regards hoops, in which Continental makers again began to compete at under the prices quoted by Lancashire manufacturers. In bars and sheets makers have not had to contend to the same extent with foreign competition, prices in Belgium having similarly advanced with those in this country, and with the close of the year makers, as a rule, are well sold over the first quarter of 1896, and their prices are exceedingly firm at full list rates.

The steel trade also shared in the general depression at the commencement of the year; with prices exceptionally low, hematites being nominally quoted 52s. less 2½; billets, £3 17s. 6d., net cash; and boiler-plates about £6 to £6 5s., delivered Manchester district. Even these low prices tended steadily downwards—except for a slight recovery during May—until in August, a considerably increased weight of buying came forward, several fairly large orders being placed in hematites, which stiffened up to 53s. 6d. and 54s. 6d., less 2½; with steel billets, which had been offering as low as £3 15s., getting back to £3 17s. 6d., net cash. With the increased activity in the shipbuilding centres, the competition of Scotch makers was gradually withdrawn from this market, and boiler-plates also steadily moved upwards in price, until local makers

were quoting fully £6 10s., delivered Manchester district. Prices for raw material continued to advance until good foundry hematites touched 57s. 6d. and 58s., and billets £4 5s. and £4 10s. A decided slackening off in buying followed, and the protracted dispute in the Clyde and Belfast shipbuilding industry still further had a depressing effect upon the position of the steel trade; hematites gradually gave way towards the close of the year, 56s. becoming about an average figure, with good steel billets obtainable at £4 to £4 5s., and the competition of Scotch makers of steel plates, who, through the stoppage of work on the Clyde, were driven to seek orders elsewhere, brought down boiler-plates to £6 and £6 5s., delivered Manchester district.

In the coal trade the position at the close of last year was very unsatisfactory, and with the exception that the unusually protracted severe weather during the early months of the present year brought forward an extra pressure of demand upon house coals, until, well on in the spring, the condition of trade has shown no improvement, prices having steadily receded, whilst pits have had to go on shorter time than has been known for years past. At the beginning of the year best Wigan Arley was quoted 10s. 6d. to 11s.; Pemberton 4 ft. and seconds Arley, 9s. 6d. to 10s.; and common house coal, 7s. 6d. to 8s. With the severe weather during the first quarter of the year the large requirements for house-fire consumption necessarily kept pits on full time and prices at full list rates, but there was no actual advance, and when, in March, the milder weather set in and the extra demand disappeared, pits were forced on to short time and prices began to show a downward tendency. All through the summer the house-coal trade remained in an extremely depressed condition, with many of the pits working about half-time, and prices generally receding, best Wigan Arley getting down to 10s., Pemberton 4 ft. and seconds Arley 7s. 6d. to 8s., and common house-coal 7s. per ton. With the exception of a fairly large weight of buying for winter requirements during October, which caused a hardening of prices and enabled many of the pits to go on full time, business has continued very slow right up to the close of the year, when 10s. to 10s. 6d. for best Wigan Arley, 8s. 6d. to 9s. for Pemberton 4 ft. and seconds Arley, and 7s. to 7s. 6d. for common house-coals were about the average figures. With regard to the lower qualities of round coal suitable for iron-making, steam and general manufacturing purposes, the position throughout the year could scarcely have been more unsatisfactory. Except that the extra pressure during the first three months of the year, for house-fire purposes, helped to take off the market some of the lower qualities of round coal ordinarily sold for manufacturing requirements, common round coals have all through continued a complete drag, and prices have been forced down to perhaps a lower point than has been known for a considerable number of years past. During the earlier part of the year common round coals were fetching 6s. 6d. to 7s. at the pit, but with the falling off in the sales for house-fire consumption, and no improvement in the demand for general manufacturing purposes, the excessive supplies offering compelled sellers to take extraordinarily low prices, and it became difficult to get more than 6s. for good qualities of steam and forge coal at the pitmouth, for inland sales, with 5s. 6d. readily taken on shipping orders, and needy sellers as low as 5s. per ton. Even the revival of activity in the engineering and other coal-using industries during the second half of the year, has not as yet caused sufficiently increased demand upon the lower qualities of round coal to have any appreciable effect upon the excessive supplies offering, and at the close of the year 6s. to 6s. 6d. still represent about the average figures at the pitmouth for inland sales, and 5s. 6d. to 6s. for shipment. Gas, coal, and locomotive fuel contracts have also been settled at excessively low figures, the average prices taken for gas coal being about 1s. to 1s. 3d. under last year's figures, whilst locomotive fuel contracts have been settled at 6d. below the prices taken last season. Engine fuel has shown comparatively little variation in price. Supplies have necessarily fluctuated with the demand for round coal, and this has operated to maintain a fairly steady tone in prices. At the commencement of the year common slack was fetching 3s. 6d.; good medium sorts, 4s. 3d. to 4s. 9d.; and best about 5s. per ton at the pitmouth. These prices have remained the average figures practically all through the year, the only alteration being in the inferior descriptions, which with the close have got down to 2s. 6d. and 3s., with better sorts about 4s. 6d. to 5s. at the pitmouth.

## BELFAST TRADE NOTES.

(From our own Correspondent.)

THE position of affairs in the engineering and shipbuilding trades here is worse than has yet been the case since the present disastrous dispute began.

During the month strenuous efforts were made by the Lord Mayor of Belfast and the Lord Provost of Glasgow to bring about a second conference between the masters and men. These latterly proved successful, and after several gentlemen had been nominated to act as chairman, the choice fell on Lord James of Hereford, to be supported in his good offices by the Lord Mayor of Belfast and Lord Provost of Glasgow. A conference was held in the palatial Municipal Buildings in Glasgow, and lasted for two days. A speedy settlement of the dispute was anticipated from the hopeful tone of the daily Press; but intense surprise and disappointment were manifested when it became known that the masters' proposals had been rejected by an overwhelming majority of the men at an aggregate meeting held to consider them. The masters proposed to grant the Belfast men 1s. advance on 1st February and also withdrew the objectionable clause, "If trade warrants," the terms to remain in force for a period of six months with one month's notice on either side. Matters are therefore at a dead lock and developments are anxiously awaited, but certainly public opinion here is that the engineers have made a mistake, as having regard to the fearful amount of starvation and distress amongst the labouring classes thrown out of employment through no fault of their own, it was thought by the general public that these terms should have been accepted.

So far no personal animosity has been displayed between masters and men. There has been no rioting, and no attempt to fill the places of the strikers.

The iron moulders' dispute still remains unsettled, and is expected to remain so while the engineers' strike lasts, there being no demand for moulders till then.

There have been no launches from Messrs. Harland & Wolff's yard this month.

Messrs. Workman, Clark & Co., Ltd., intend launching on the 19th inst., from their south yard, a large steamer named the *Langton Grange*, for Messrs. Houlder Bros., London. The vessel is another addition to their splendid fleet known as the "Grange Line." She will have extensive refrigerating machinery fitted on board, and is intended to run between London and Melbourne. She will be fitted with powerful triple-expansion engines to run at a high rate of speed. Steam will be supplied from three large single-ended boilers, fitted with Howden's system of forced draught. The engines and boilers will be supplied and fitted on board at the builders' own engine works.

This firm will also launch, on Friday 20th inst., from their north yard, a small steamer for Messrs. Alfred Holt & Co., Liverpool. She will be named the *Charon* and is a duplicate of the s.s. *Centaur*, launched from same yard last October. She will also be employed in the same trade, namely, up-river traffic in China.

As a result of the strike, the White Star Liner *Doric*, after having most of her deck fittings and hull thoroughly overhauled and new engines and boilers put on board by Messrs. Harland & Wolff, left here on the 17th ult. for Liverpool in charge of two powerful tugs. It is said that her owners will finish her in Liverpool. It was intended to despatch this vessel about a fortnight ago, but she was held back pending the Glasgow conference. There is still about six weeks work for a large number of men on board. Whether this programme can be carried out remains to be seen.

The s.s. *Historian*, for Messrs. T. & J. Harrison, of Liverpool, is also much behind her time now, and although a large number of apprentices have been transferred from the *Doric* on board her, it is not at all unlikely that she will leave here in an incomplete state, and be finished elsewhere.

The s.s. *Cestrian*, for Messrs. Frank Leyland & Co., Liverpool, has had part of her machinery put in, but is not being pushed on at present.

Messrs. Harland & Wolff and Messrs. Workman, Clark & Co. closed their yards on Friday, 20th ult., for the Christmas holidays, and it is probable they will be closed for a much longer period than is usual at this time.

No news of any new work being placed here have reached the public, and everything points to a very dull beginning for 1896.

Since writing above, Messrs. Workman, Clark & Co. have

launched the s.s. *Charon*, but have decided to keep the s.s. *Langton Grange* on the stocks till after the holidays.

A painful sensation has also been cast over this city by the sudden and unexpected death of Sir Edward Harland, the head of the firm of Harland & Wolff. The sad event took place on the 23rd ult.

## NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

**Barrow-in-Furness.**—There is not much that is new to report in connection with the shipbuilding and engineering trades of this district. No new orders have been booked during the month, except another order from the Admiralty for two of the 30-knot torpedo-boat destroyers embraced in last year's programme. The success which has been achieved by the three 27-knotters built at Barrow has won for the Naval Construction and Armaments Co. distinction in the building of this class of craft, and there can be no question that after the experience gained the company will very readily be able to turn out the 30-knotters not only with the requisite rate of speed, but with vessels of sufficient stability, although of exceedingly light construction, to stand the strain which high speeds set up. There has not been much commercial work at the Barrow Yard this year, and the demand for commercial tonnage is still very small, but one or two projects are in hand which are likely during next year to find important work for the Barrow company, and when to this is added the important Admiralty work now engaging the attention of Barrow builders, it will readily be seen that a good new year's work is in store. There is also the prospect of good orders from various foreign sources, especially from China, Japan, Chili, and elsewhere. The weather experienced during December has had very harassing effects on shipbuilding work. Not only have the short days limited the working hours, but the wet and dull weather has frequently stopped operations for two or three days together in outside work. The *Powerful* is making rapid strides towards completion. The Belleville boilers have been already put on board, and most of them tested, and the funnels are now being put in. The engines are aboard, and will soon be fitted up and ready for turning round. They are splendid specimens of engineering design and skill, and are of considerable height when it is considered they have to work under the ship's protective deck. Early next year the Naval Construction and Armaments Co. will launch the second of the second-class cruisers they are building for the Admiralty, the *Doris*, who is already fully plated and almost ready for putting into the water. Her sister ship the *Juno*, launched in November, is being fitted up in the Devonshire Dock. Her engines and boilers are ready for her, and will be lifted into her hold in January. The work of building the two Clan Line steamers, *Clan Menzies* and *Clan Lindsay*, has so far proceeded that it is evident one of the two will be launched in January, and the second one in February or March. Fears have been entertained that the dispute in the shipbuilding trade with the engineers would extend to Barrow and the Tyne because the masters have joined the Federation, whose object is mutual protection, but the probabilities seem to be that Barrow will escape the difficulty, as it is believed it will be settled before the New Year, and up to the present time no decision has been come to by the Federation calling upon the masters on the Tyne and at Barrow to lock their men out. Some of the engineers employed at the Barrow works have had notice to leave because the work in hand is so far completed that their services for some time to come can be dispensed with.

The following is a list of vessels launched in 1895 by the Naval Construction and Armaments Co., Limited, Barrow-in-Furness:—

Name and Type.	Tonnage	I.H.P.
H.M.S. <i>Starfish</i> , torpedo-boat destroyer .....	270	4500
H.M.S. <i>Skate</i> , torpedo-boat destroyer .....	270	4500
H.M.S. <i>Powerful</i> , first-class cruiser .....	14500	25000
H.M.S. <i>Juno</i> , second-class cruiser .....	5600	9600
<i>Burns</i> , sludge steamer .....	1020	1900
No. 2 Dredger, sand pump dredger .....	54	50
<i>Duke of Lancaster</i> , passenger steamer .....	1546	5600
<i>G. B. Crow</i> , sand pump dredger .....	2384	2000
H.M.S. <i>Majestic</i> , machinery only .....		12000

Total .... 25644 64150

Last year the gross tonnage was 20,656 tons, and the indicated horse-power 29,550. It will be seen there has this year been a considerable increase both in tonnage and horse-power.

**West Cumberland.**—There are no new features to chronicle in connection with the shipbuilding trades of West Cumberland. The orders in hand are being satisfactorily proceeded with, and there is reason to believe new work will come to hand so soon as those orders now in hand are in a fair way towards completion. It is a remarkable fact that for years past the shipbuilding industry of West Cumberland has been kept steady and busy even when in other districts orders have been scarce.

**Shipbuilding Material.**—There is very little demand for shipbuilding material at present, owing to the stoppage of so many yards in consequence of the engineers' dispute. The mills at Barrow have been idle for four months, but so soon as the dispute is settled operations will be recommenced, and orders now held and others in prospect will keep the works going during all next year, if not for a longer period.

**The Hematite Trade.**—The demand for hematite pig-iron is steady, and the market has not fluctuated much, while prices have been kept fairly steady. They now stand at 47s. per ton for warrant sellers net cash, and makers quote 48s. 6d. to 50s. net f.o.b. for mixed numbers. Stocks of hematite have increased during the year 117,000 tons.

## Miscellaneous.

**H. E. Moss & Co.'s Steamship Circular.**—Since the issue of our last circular in May, the shipping trade has remained in a very depressed state, and we cannot yet report any general improvement. In certain directions freights have been better, but, speaking generally, the past six months have been most unsatisfactory, especially so for the owners of all, except the most modern and best carrying type of steamers. Still there is a feeling that we have now seen the worst, and with the general improvement in trade and the opening of new markets, it is justifiable to think that 1896 will be a more satisfactory year for shipowners, if the first improvement in freights is not made the signal for an unreasonable rush to order new boats. A considerable quantity of obsolete tonnage has been broken up during the last six months, but there still remains several hundred thousand tons of old steamers which for trading purposes (if a profit is considered a necessary feature) are absolutely valueless, and the sooner the owners of such vessels submit to the inevitable the better for themselves. The number of "tramp" steamers building at the present time is not excessive. This is in itself a good feature, but it is qualified by the fact that the regular lines and companies are supplying themselves with large carrying cargo boats, which will absorb a good deal of the employment which would otherwise fall to the lot of the "tramp" boats. Prices for building are just a shade harder than at the beginning of the year, but steamers can still be built at very low prices. It is probable that large Government contracts will shortly be given to some of the leading shipbuilding firms, and this will no doubt stiffen prices, as the mere talk of Government orders has an effect on the minds of both shipbuilders and their employes (and consequently on prices) quite disproportionate to the real value of such orders. The present price for ordinary "tramp" steamers is about £7 per ton deadweight for boats about 2,500 tons deadweight, and £5 17s. 6d. to £5 12s. 6d. for boats 5,000 to 6,000 tons. There has been no difficulty during the last six months in disposing of the better class of second-hand steamers, and a large number of sales have been made, but there is no marked alteration to report in the selling prices. When better freights are obtainable, good boats which have been bought at these low prices are bound to turn out remunerative investments.

**Catalogue.**—We have received a new catalogue from the Magnolia Anti-Friction Metal Co., of 75, Queen Victoria Street, and this shows that the ingenuity of those who seek to give publicity to the specialities they have to offer to the public (whilst giving the public something which in itself repays attention) is by no means exhausted. The present book is well got

up. The printing, paper, and execution of the drawings are all first-class. But there is something beyond and above this. There is positive use and instruction to be got out of the perusal of these pages. The plan of dividing out the catalogue into a series of smaller volumes, each dealing with one special form of the metal adapted for a certain trade, has recommended itself to the manufacturers. The present then deals only with Magnolia metal for locomotive purposes. We are given certain tests showing how, as a bearing metal, Magnolia compares with other substances. Then we are given an illustrated account of a furnace for the melting, and directions how best to execute this work. The little furnace is adapted for use with gas in ordinary cases, but as there are places where gas is unobtainable, there is an adaptation of the apparatus for use with oil. They are afforded drawings of various parts of locomotive engines, drawn by a skilled draughtsman, showing how best the Magnolia metal can be used for such purposes as the making of journals, slide blocks, big end bushes for connecting rods, and such like. Perhaps the most interesting is the description of how to make a cheap and efficient slide valve by a combination of Magnolia metal with cast-iron. By means of the arrangement here shown it is possible to make a slide valve, giving all the efficiency which Magnolia metal has proved itself to have over gun-metal, at a cost, in the first instance, of not much more than one-half, whilst it is said the wear will be three times as long. As the catalogue tersely puts it, "Surely these figures are worth testing by any locomotive superintendent." We shall look forward with interest to the publication of the marine portion of the catalogue and wonder if the ingenious writers and compilers will be able to make that as interesting to the marine engineer as this is in its particular line.

**Griffin's Nautical Series.**—For the use of officers of the merchant navy, students in naval architecture, and others interested in the Mercantile Marine. Edited by Edward Blackmore, Master Mariner, First Class Trinity House Certificate, Assoc. Inst. Naval Architects, President of the Shipmasters' Society, &c., &c. The following volumes are arranged for and will be issued, it is hoped, during the spring of 1896:—(1) "The British Mercantile Marine: an Historical Sketch of its Rise and Development; with chapters on the Education of Officers; Duty and Discipline, &c." By the Editor. (2) "The Construction and Maintenance of Vessels built of Steel." By a Practical Engineer and Shipwright. (3) "Know Your Own Ship: a Simple explanation of the Stability, Construction, Tonnage, and Freeboard of Ships." By Thomas Walton, Naval Architect, Lecturer to Ships' Officers, Government Navigation School, Leith. (4) "Latitude and Longitude: How to find them." By W. J. Millar, M.Inst.C.E., Secretary to the Inst. of Engineers and Shipbuilders in Scotland. (5) "Elementary Seamanship (A Manual of)." By D. Wilson-Barker, Master Mariner, F.R.S.E., F.R.G.S., &c., &c., Younger Brother of the Trinity House. (6) "Ocean Meteorology: For Officers of the Merchant Navy." By William Allingham, First Class Honours, Navigation, Science and Art Dep. (7) "Navigation: Theoretical and Practical." By D. Wilson-Barker, Master Mariner, &c., and William Allingham. (8) "Practical Mechanics: Applied to the requirements of the Sailor." By Thos. Mackenzie, Master Mariner, F.R.A.S. (9) "Practical Algebra and Trigonometry: For the Young Sailor, &c." By Richard C. Buck, of the Thames Nautical Training College, H.M.S. Worcester. This series has been designed to meet the growing desire on the part of officers in the Mercantile Marine for a more scientific insight into the principles of their profession, and the sciences upon which the Art of Navigation is founded. The treatises will, for the most part, be written by sailors for sailors; and where this is not the case, by authors who have special knowledge of the subjects dealt with and their application to the sailor's life. The treatment will be thoroughly scientific, yet as free as possible from abstruse technicalities, and the style such as will render it easy for the young sailor to gain a knowledge of the elements of his profession by private reading and without difficulty. Each volume will contain about 150 pages and will be published at such a price as will bring it within the reach of all. London: Charles Griffin & Co., Limited, Exeter Street, Strand.

**New Contracts.**—Messrs. Ramage & Ferguson Limited, Leith, have contracted to build a steam yacht of 220 tons, and a twin-screw steamer for East London, South Africa.

## LAUNCHES AND TRIAL TRIPS.

## LAUNCHES—ENGLISH.

**Andania.**—Lately there was launched by Messrs. Pickersgill, at Southwick, a steel screw cargo steamer, built to the order of Liverpool owners. The vessel is of the following dimensions:—Length, 310 ft.; breadth, moulded, 42 ft. 6 in.; depth, moulded, 21 ft. 9 in.; and is built to Lloyd's highest class as a partial awning-decked steamer. The engines, which are supplied by Messrs. Geo. Clark, Limited, are of the triple-expansion type, having cylinders 22½ in., 37 in., and 61 in., with 42 in. stroke. The vessel was named the *Andania*.

**Penarth.**—On November 18th the *Penarth*, a steel schooner-rigged steamer of about 3,000 tons gross, was launched at West Hartlepool, owned by the Penarth Steamship Co., Cardiff.

**Crystal.**—On November 20th an iron steam ketch, of 150 tons gross, named the *Crystal*, was launched at Hull, owned by the Kingston Steam Trawl Co.

**Merlin.**—On November 20th an iron steam ketch, of 150 tons, named the *Merlin*, was launched at Beverley. Owned by Mr. T. Baskcomb.

**Liverpool.**—On November 22nd a steel steam tug of 116 tons gross, named the *Liverpool*, was launched at Port-Glasgow. Owned by the Compagnie Générale Transatlantique.

**Alchymist.**—On November 23rd Messrs. Dobson launched at Low Walker-on-Tyne a steel screw steamer, named *Alchymist*, which they have built to the order of Messrs. Burt, Boulton & Haywood, of London. The dimensions of the vessel are:—Length, 155 ft.; breadth, 24 ft.; and depth, moulded, 18 ft. 6 in. The steamer has been specially designed and constructed for carrying coal-tar or creosote oil in bulk. The propelling machinery, constructed by the North-Eastern Marine Engineering Co., Limited, of Wallsend, consists of a set of triple-expansion engines, having cylinders 12½ in., 20 in., and 38 in. in diameter, with a stroke of 24 in.

**Hanbury.**—On Friday afternoon, November 29th, Messrs. The Blyth Shipbuilding Co., Limited, launched from their shipbuilding and dry dock works, at Blyth, a steel screw steamer of the following dimensions:—Length, 176 ft.; breadth, 26 ft.; depth, 12 ft. 7 in. The vessel has been built for Messrs. E. Stock & Sons, of Bristol, for their Channel trade, and is fitted up with the most advanced types of deck machinery for the quick despatch required in that service. The vessel has a cellular double bottom for water ballast, raised quarterdeck over engines and boiler, which are placed aft in the vessel. The captain and officers' accommodation is neatly arranged in bridge amidships, the engineers' berths being placed in the after part of the vessel, and the crew housed forward in fore-castle. She is rigged as a three-masted schooner and has steam steering gear amidships by Donkin & Co., screw gear aft, and steam windlass by Emerson, Walker, on fore-castle, together with very large winches, by Robert Welford, for working the cargo expeditiously. The engines are of the compound type, and will be fitted by Messrs. Westgarth, English & Co., Middlesbro'. As the vessel left the ways she was gracefully named the *Hanbury* by Mrs. A. Matthews, of Blyth.

**Queen Olga Constantine.**—On November 30th Messrs. Dobson & Co. launched at Low Walker-on-Tyne the *Queen Olga Constantine*, a steel twin-screw steamer which they have built to the order of the Archangel-Mourman Steam Navigation Co., of Archangel, for their mail, passenger, and general trading service between the White Sea and the Mourman coast. The dimensions of the vessel are:—Length, 245 ft.; breadth, 38 ft.; depth, 21 ft. 6 in.; built to Lloyd's highest class. The propelling machinery, which is on the twin-screw principle, consists of two sets of triple-expansion engines, having cylinders 12½ in., 20 in., and 38 in. diameter, with a stroke of 24 in. These are being constructed by the North-Eastern Marine Engineering Co., of Wallsend.

**Rodney.**—On Saturday afternoon, November 30th, Messrs. Richardson, Duck & Co., launched from their yard a steel screw steamer of the following dimensions, viz.:—Length over all, 809 ft.; breadth extreme, 43 ft.; depth, moulded, 19 ft. 8½ in.; gross tonnage, about 2,470 tons. This vessel, which has been built to the order of Edwin Nye, Esq., of London, for the Trafalgar Steamship Co., Limited, will take Lloyd's 100 A1 class, and has been built under special survey. She has a

break poop aft, with accommodation for captain and officers, short raised quarter-deck, and awning deck from mainmast to stem. Engineers are berthed in between decks, abaft engine room, and crew in fore-castle. A cellular double bottom is fitted throughout for water ballast, also after peak tank, and equipment includes four steam winches, large horizontal multitubular donkey boiler, steam steering gear, steam windlass, stockless anchors, and all modern improvements for facilitating loading and discharging. The engines, by Messrs. Blair & Co., Limited, have cylinders 22½ in., 37 in. and 61 in. by 42 in. stroke, steam being supplied by two single-ended boilers, having a working pressure of 160 lb. Messrs. E. J. Caiger & Co., of 77, Billiter Buildings, London, have superintended the vessel during construction. As the vessel left the ways she was christened *Rodney* by Mrs. Nye, of Naworth, Shortlands, Kent.

**Rudelsburg.**—On Monday, December 2nd, Sir Raylton Dixon & Co. launched from Cleveland Dockyard, Middlesbro', a fine steel screw steamer *Rudelsburg*, built to the order of the Hansa Steamship Co., of Bremen, under the supervision of Mr. D. Wulff, their superintendent engineer. The principal dimensions are:—Length, 323 ft.; beam, extreme, 42 ft. 6 in.; depth, moulded, 25 ft. She is built to Lloyd's 100 A1 class spar-deck rule, the poop, bridge, and fore-castle decks being of teak. The captain, officers and engineers are accommodated in houses which are handsomely fitted up on bridge deck, and the crew and firemen are berthed in commodious quarters in topgallant fore-castle. Triple-expansion engines built to German law requirements will be supplied by Messrs. T. Richardson & Sons, Limited, Hartlepool, having cylinders 22½ in., 38 in., and 62 in. by 42 in. stroke, with two large single-ended boilers, working at 200 lbs. pressure. This is the sixth steamer Sir Raylton Dixon & Co. have launched for the Hansa Co. within two years, and other two steamers are on the stocks for the same owners.

**Deike Rickmers.**—On December 2nd the new steel screw steamer *Deike Rickmers* was launched by Messrs. Priestman & Co., at Southwick, Sunderland, for the well-known firm of Messrs. Rickmers, Reismuhlen, Rhederel & Schiffbau, A.G., Bremen, Germany. Her principal dimensions are:—Length, 355 ft.; breadth, extreme, 44 ft.; depth, moulded to spar-deck, 28 ft. 9 in. The vessel has been built to Lloyd's highest class. Engines of the triple-expansion type will be supplied by Messrs. William Allan & Co., of Sunderland. The cylinders are 28 in., 38 in., and 65 in. diameter, with a piston stroke of 42 in.

**Hardwick Hall.**—There was launched on December 2nd, from the Jarow yard of Messrs. Palmer's Shipbuilding and Iron Co., Limited, a large screw steamer, built to the order of Messrs. Robert Alexander & Co., of Liverpool. Her dimensions are as follows, viz.: 380 ft. by 45 ft. by 30 ft. 9 in., moulded. The vessel is constructed of steel to obtain Lloyd's highest class, and will be rigged up as a two-masted schooner. She is of the decked type, with a poop, bridge, and fore-castle. The poop is fitted for the accommodation of the crew. The bridge covers the machinery, opening amidships, the accommodation for the captain and officers being in steel deck houses on the top of bridge deck. The fore-castle is fitted for store-rooms, &c. Arrangements are made for carrying water ballast in a partial double bottom at aft, and a deep tank amidships. The vessel is fitted with two steel decks extending all fore and aft, and she is divided into seven watertight compartments by means of six steel bulkheads. She will also be fitted with a complete system of shifting boards, grain hatches, and all the latest requirements for carrying grain cargoes in bulk. A powerful steam windlass is fitted for working the cables, and a steam steering gear amidships and all necessary steam winches, derricks, &c., for the rapid loading and discharging of cargoes will be supplied, and the vessel will be fitted with all the most modern improvements for a vessel of her class, and is designed to load about 6,300 tons deadweight, on about 24 ft. 6 in. draught. The vessel has been built under the personal superintendence of Mr. Dalrymple, superintending engineer, of Liverpool, and Mr. Maxwell Hill, of Newcastle. As the vessel left the ways she was christened the *Hardwick Hall* by Miss Flora Foster, daughter of Captain Foster, who represented the owners. The company then adjourned to the model room, when Mr. J. P. Wilson proposed success to the ship, coupling the toast with the name of Miss Foster. Mr. Dillon, secretary

of Palmer & Co., proposed the health of the owners, Messrs. Robert Alexander & Co., remarking that the *Hardwick Hall* is the eighth ship built for Messrs. Alexander by Palmer's Co. Captain Foster responded, and the proceedings then terminated.

**Baltazan.**—On Tuesday afternoon, December 3rd, there was launched from the yard of Messrs. Robert Thompson & Sons, Southwick, a handsome cargo steamer for Liverpool owners, the dimensions being:—Length, 340 ft.; breadth, 47 ft.; depth moulded, 25 ft. 10 in.; with poop, bridge with accommodation for captain, officers and engineers, and topgallant forecastle for sailors and firemen. Water ballast is on the cellular principle with peak tanks, 5 large hatches, and 5 powerful steam winches by Mr. John Wigham, double derricks for rapid loading and discharging, also cargo ports. The vessel will carry about 5,000 tons on a very light draught. The engines, which are being supplied by Messrs. Geo. Clark, Limited, have cylinders 24 in. by 39 in. and 64 in. by 42 in. stroke, with two extra large boilers. During construction, both hull and machinery have been superintended by Mr. H. F. Payne, of Liverpool. As the vessel left the ways she was gracefully christened *Baltazan* by Miss Kathleen Thompson.

**Nanette.**—On Tuesday, December 3rd, Messrs. William Gray & Co., Limited, launched the fine steel screw steamer *Nanette*, which they have built to the order of the Pyman Steamship Co., Limited, of West Hartlepool. The vessel will take Lloyd's highest class, and her dimensions are:—Length over all, 305 ft.; breadth, 42 ft., and depth, 21 ft. 9 in. The deck erections consist of a full poop, bridge over machinery space, and topgallant forecastle. A handsome saloon and cabins for officers, &c., are fitted up aft, the engineers' rooms are in the bridge, and the crew's accommodation forward, including a bathroom for seamen and firemen. The hull is built on the web frame system with a cellular double bottom, large hatchways, 4 steam winches, steam steering gear amidships, hand screw gear aft, two donkey boilers, patent direct steam windlass, by Emerson, Walker & Co., boats on beams overhead, shifting boards throughout, stockless anchors, two masts with schooner rig, and a complete outfit for a first-class cargo vessel. The Central Marine Engine Works of Messrs. Wm. Gray & Co., Limited, supply fine triple-expansion engines of 1,200 I.H.P., having cylinders 22 in., 35 in. and 59 in. diameter, with a 39 in. piston stroke, and two large steel boilers to work at 160 lbs. pressure per square inch. The vessel and machinery have been built under the superintendence of Captain T. Pyman and Mr. Cromar on behalf of the owners, and the ceremony of christening the steamer *Nanette* was gracefully performed by Miss Nanette Pyman, daughter of Councillor George Pyman, J.P., of Rosebank, West Hartlepool.

**Condor.**—On December 4th Messrs. Cochrane & Cooper launched from their yard at Grovehill, a steam trawler, built to the order of Mr. Thomas Baskombe, of Grimsby, of the following dimensions:—93 ft. long by 20 ft. 6 in. beam, and 11 ft. deep. The vessel, which is a sister ship to the *Merlin*, launched for the same owner a fortnight previous, was named the *Condor* by Miss Lettie Baskombe. Messrs. C. D. Holmes & Co., of Hull, will supply engines of 40 H.P. with triple expansion.

**Grantor.**—On Thursday, December 5th, Messrs. Furness, Withy & Co., Limited, launched from their shipyard at Middleton, a large steel screw steamer, built to the order of Messrs. J. Holman & Sons, London. The vessel is a substantial type of a modern cargo steamer, measuring over 320 ft. in length, and is built throughout of Siemens-Martin steel to the highest class at Lloyd's, having a large measurement and deadweight capacity. Every care has been taken in designing this vessel to construct her as strong as possible for the heavy deadweight trade. The vessel is built on the web-frame principle with cellular double bottom all fore and aft and subdivided at intervals, the after peak being also available as a ballast tank. The main and fore holds are divided by watertight bulkheads, efficiently stiffened by an iron longitudinal division. The greater portion of the shell plating is in 24 ft. lengths, and is efficiently backed up by strong sectional framing to the top of the vessel all fore and aft, the topsides being extra thick to withstand the heavy Atlantic trade. The bottom plating is also thicker in way of the ballast tanks, to allow of the vessel lying aground whilst loading. The whole of the weather decks, tank top, floor plates, etc., are also of extra thickness, and the hatchways are of a size to take in the bulkiest cargo. Large steam winches, patent steam steering gear amidships with hand gear aft, steam windlass, large donkey boiler and patent

stockless anchors are fitted. The vessel is rigged as a two-masted schooner. The engines and boilers are being supplied by Messrs. Blair & Co., Stockton, and are of massive design with every provision for economical working. The ship and engines have been constructed under the supervision of Mr. E. C. Caiger on behalf of the owners. On leaving the ways the vessel was gracefully christened *Grantor* by Miss Ethel Withy.

**Manzanillo.**—On Tuesday afternoon, December 17th, Messrs. Craig, Taylor & Co. launched from their Thornaby Shipbuilding Yard, Thornaby-on-Tees, a mail and passenger steamer of the following dimensions:—171 ft. 3 in. by 24 ft. 9 in. by 11 ft. 9 in. to the main deck. She is built of steel to the highest class in Lloyd's, and is handsomely fitted up with accommodation for first and second-class passengers, and also every modern improvement for dealing with cargo. The vessel has windlass, steam steering gear, two steam winches, and large donkey boiler, water ballast in fore and after peaks, also complete installation of electric light by Messrs. J. H. Holmes & Co., Newcastle. Her engines are being constructed by Messrs. Westgarth, English & Co., Middlesbrough, and are of the following sizes:—15 in., 25 in., 41 in., by 27 in. stroke, with a large boiler to work at 160 lb. pressure. The vessel, which is for the Pacific coast of Mexico, will also be employed in Government service, and will consequently be fitted with two quick-firing guns. In addition to these she carries a patent oil launch. The vessel has been built under the superintendence of Mr. S. F. Prest, of London, and as she left the ways she was gracefully christened the *Manzanillo* by Miss Prest, of Ripon, sister of the consulting engineer, who was presented with a very pretty bouquet by Master Vernon Taylor, son of one of the builders.

**Holgate.**—On Tuesday, December 17th, Messrs. Wm. Gray & Co., Limited, launched the fine steel screw steamer *Holgate*, which they have built to the order of the London and Northern Steamship Co., Limited, Messrs. Pyman Bros., London, managers. The vessel will take Lloyd's highest class, and her dimensions are:—Length, over all, 329 ft.; breadth, 44 ft.; and depth, 23 ft. 3 in.; deadweight, over 4,100 tons, on a draught of about 19 ft. The deck erections consist of a half poop, bridge over machinery space and topgallant forecastle. A handsome saloon and cabins for officers, etc., are fitted up aft, the engineers' rooms are in the bridge, and the crew's accommodation forward, including a bath-room for seamen and firemen. The hull is built on the web frame system, with a cellular double bottom. Large hatchways, powerful steam winches, steam steering gear amidships, hand screw gear aft, two donkey boilers, patent direct steam windlass by Emerson Walker Bros., boats on beams overhead, shifting boards throughout, stockless anchors, two masts with schooner rig, and a complete outfit for a first-class cargo vessel. The Central Marine Engine Works of Messrs. Wm. Gray & Co., Limited, supply triple-expansion engines, having cylinders, 23 in. 36 in. and 62 in. diameter, with a 39 in. piston stroke, and two large steel boilers to work at 160 lb. pressure per square inch. Captain T. Pyman and Mr. Wm. Cromar have supervised the construction on behalf of the owners. The ceremony of christening the steamer *Holgate* was gracefully performed by Miss May Pyman, of West House, West Hartlepool, niece of the managing owners.

**Steam Pinnace.**—On Tuesday, December 17th, Messrs. G. F. G. Des Vignes & Co., Limited, launched from their Orleans Boat Yard, Teddington, a Bull's metal steam pinnace, built to the order of Messrs. Siemens Bros., of Queen Anne's Gate and Woolwich, for use in their present South American cable laying expedition up the river Amazon. This vessel, whose skin and frames are built entirely of the highest quality of Bull's metal, has been completed in the remarkably short space of five weeks from the delivery of the material. She is of a specially light type, intended to be rapidly and easily hoisted and lowered by the ordinary davits of the cable ship *Faraday*, and is built with the object of being a good sea boat, and at the same time having considerable speed for a boat of her moderate length. The space available along the ship's side determined the length which the builders would have preferred to increase somewhat. They had to build the biggest boat they could within the length of 37 ft. 6 in., with 3 ft. 7 in. beam, and 3 ft. 10 in. depth. She is fitted with a locomotive type boiler of Mr. G. F. G. Des Vignes's special design in regard to proportion of fire-box, length of tube, water space, diameter and heating surface. The engines are com-



pound, with cylinders 6 in. and 12 in. by 8 in. strokes. They run at 380 revolutions a minute, and drive a three-bladed propeller of increasing pitch, in which three phosphor bronze blades are keyed into a phosphor bronze bush, the whole arrangement offering very little opposition to the flow of water. The whole of the working parts of the engines are made of phosphor bronze and steel. The air and feed pumps, which are of very special design, are worked by a separate crank shaft, revolving at a greatly reduced speed as compared with the main engines and are driven by a pitch chain from the crank shaft. At the trial a steam pressure of 150 lbs. was easily maintained with natural draught, and during a portion of the time the fire doors were partially open and the dampers down. A speed of 11 miles was guaranteed, and a speed of about 12½ miles was easily obtained with natural draught. A vacuum of 29½ in. was obtained during the whole run. It is worthy of note that the boat was only launched (having been built at great pressure), at 8 o'clock on Tuesday morning. The fire was lighted at 10 minutes to 2, and the engines first moved at 2.30, and the boat left the wharf at 2.45 for Woolwich, passing through London and the crowded Pool in darkness and slight fog, which involved the necessity of bringing the speed down to three or four miles an hour. The ship was reached at 8 o'clock, without the engines having once required attention of any kind. The earlier part of the run was made at three-quarters and full speed till darkness necessitated reduced speed. The vessel is lined throughout with teak, and is fitted at the forward and after ends with a teak deck, and specially strong bulkhead slings have been fitted for lifting purposes, so that no slings under the boat are required. This little vessel is of a type which should be carried by every important mail steamship, and would serve many valuable functions when anchored in foreign ports. We understand Messrs. G. F. G. Des Vignes & Co. have a vessel of similar type in hand for another firm in addition to ordinary launches for river work. We shall hope at an early date to give illustrations of this boat and engines.

#### LAUNCHES.—SCOTCH.

**Hero.**—On November 30th Messrs. J. & J. Hay launched at Kirkintilloch, a steamer for the coasting trade. Her dimensions were:—Length, 66 ft.; breadth, 16 ft. 3 in.; depth, 7 ft. 3 in. The vessel was named *Hero*, and is for Messrs. Hay's own trade.

**Wong Koi.**—On December 4th there was launched from the yard of the Fairfield Shipbuilding and Engineering Co., Limited, Govan, a screw steamer named the *Wong Koi*, which has been built to the order of the Scottish Oriental Steamship Co., for whom 11 steamers have already been built at Fairfield. The vessel has a gross register tonnage of about 1,800 tons, and is of the following dimensions:—Length between perpendiculars, 290 ft.; breadth of beam, 38 ft.; depth, moulded, 22 ft. 9 in. She is the first of two vessels at present under construction by the Fairfield Co., for the Scottish Oriental Steamship Co., and is classed in the highest grade of the Bureau Veritas, and is under the Board of Trade survey. The *Wong Koi* has a cellular double bottom for water ballast, and is almost identical with the *Keong Wai*, launched from the same yard in the early part of this year. She has a top-gallant fore-castle, a bridge with shade deck, extending aft over the midship part of the vessel, having a chart and wheel-house above, and a large deck-house aft, ending in a turtle back-stern. She is schooner-rigged, with two pole masts. The accommodation for first-class passengers and captain is situated in the after deck-house, with a dining-saloon and all other conveniences. The officers' and engineers' cabins are placed under the bridge deck, and the crew and firemen are berthed in the fore-castle. The 'tween decks are fitted with sidelights, while cooking and other arrangements are made for carrying a large number of Chinese passengers. The vessel will be fitted with surface-condensing triple-expansion engines, having three inverted cylinders, 22 in., 33 in., and 57 in. diameter respectively, all adapted for a stroke of 3 ft. 6 in. The high-pressure cylinder is fitted with a piston valve, the intermediate and low-pressure cylinders are fitted with slide valves—all worked by the usual double eccentric link action valve gear, and controlled by steam reversing gear. The crank shaft is built, and together with the tunnel and propeller shafts is of mild steel. The propeller blades are of manganese bronze. Steam will be supplied by two single-

ended boilers made entirely of steel, each having three corrugated furnaces, and adapted to work at 160 lb. pressure per square inch. The machinery will be fitted with all the modern improvements for economical working, including feed-water heater, evaporator, and feed-water filter and all the necessary auxiliaries. A full outfit of boats and all the usual life-saving appliances are provided. The vessel is supplied with a donkey boiler, and fully equipped with deck machinery, including steam cargo winches, steam steering gear, and steam capstan windlass. The christening ceremony was performed by Miss Macleod, daughter of Mr. Reginald Macleod, of Macleod, Queen's Remembrancer for Scotland.

**Steel Screw Hopper Dredger.**—On December 6th Messrs. Fleming & Ferguson, Limited, Paisley, launched from their yard a steel screw hopper steamer, built to the order of the Admiralty. The dimensions of the vessel are 155 ft. by 31 ft. by 12 ft. 6 in., and she has a carrying capacity of 600 tons. Her engines, which will be supplied by the builders, are of the compound surface-condensing type, and will be capable of indicating 600 H.P. This is the first of three similar vessels which this firm have in hand for the Admiralty, for improvements being carried out on Portsmouth Harbour.

**Nithsdale.**—On December 12th Messrs. Russell & Co., shipbuilders, Port-Glasgow, launched a three-masted barque of 1,500 tons register, to carry 2,780 tons deadweight. Her dimensions are:—Length, 246 ft.; breadth, 37 ft.; depth, 22 ft. This vessel is built to the order of Messrs. J. & A. Roxburgh, Glasgow, is named *Nithsdale* and will be commanded by Captain Steven.

**Nell-Jess.**—Messrs. S. M'Knight & Co., shipbuilders, Ayr, have launched from their yard a steel screw-steamer, named *Nell-Jess*, for the Goole and West Riding Steamship Co., Limited, Goole (Messrs. Hunter & Ezard, managers), for their general carrying trade. Dimensions:—Length, between perpendiculars, 168 ft.; breadth, 26 ft. 6 in.; depth, moulded, 13 ft. 5 in.; about 500 tons gross register. She has been built under special survey to class 100 A1 at Lloyd's and has a long raised quarter-deck, bridge, and topgallant fore-castle. She is provided with all the latest improvements, and has every facility for the efficient loading and discharging of cargo. The machinery, which is compound surface-condensing of 75 N.H.P., will be supplied by Messrs. Hutson & Son, Kelvinhaugh, Glasgow; cylinders, 21 and 42 in. diameter by 30 in. stroke; boiler 18 ft. diameter by 10 ft. long, working pressure, 110 lb. On entering the water the ceremony of naming the vessel *Nell-Jess* was performed by Mr. Henry Wilson, agent for the Lancashire and Yorkshire Railway Co., Goole. Messrs. E. W. Hunter and T. A. Buttle, representatives of the company, were also present. The berth vacated by the launch of the *Nell-Jess* will be occupied by a saloon paddle-wheel passenger steamer for Messrs. P. & A. Campbell, Limited, Bristol, for their Bristol, Ilfracombe, and Channel Island passenger traffic, this being the fourth steamer Messrs. M'Knight have built for Messrs. Campbell.

**Dunstan.**—On December 14th Messrs. Barclay, Curle & Co., Limited, launched from their shipbuilding yard, Whiteinch, a steel screw-steamer built to the order of Messrs. A. Booth & Co., Liverpool. The vessel (sister ship to the s.s. *Dominic*, constructed by the builders for the same owners) is built to Lloyd's 100 A1 spar deck class, and will be fitted with every modern requisite to facilitate the working of the ship and the loading and discharging of cargo. The vessel is to be completely lit up with electric light, and is fitted with telescopic masts for service on the Manchester Canal. While constructing the vessel was superintended by Messrs. Garland and Beckett. The dimensions are:—322 ft. by 42 ft. by 28 ft., and measures about 2,970 tons gross. On moving on the ways the vessel was named the *Dunstan* by Mrs. Charles Booth, jun., Otterspool Bank, Liverpool, and afterwards proceeded to the crane to receive her engines, which are on the triple-expansion principle, and will be supplied by the builders.

**New Battleships.**—The *Mars*, battleship, building at Messrs. Laird's yard at Birkenhead, will be floated out of dock on one of the two high tides in March next. The *Doris*, second-class cruiser, building by the Naval Construction and Armaments Co., at Barrow, will be ready for launching the second week in February.

## TRIAL TRIPS.

**Gloamin.**—On November 23rd the new steel screw steamer *Gloamin*, recently launched by A. M'Millan & Son, Limited, Dumbarton, for Messrs. R. A. Mudie & Sons, Dundee, went down the Firth for her trial trip. The vessel, which is a fine specimen of the modern high-class cargo steamer, is 344 ft. long, 44 ft. 6 in. broad, and 23 ft. 6 in. moulded depth. She has been fitted by Messrs. David Rowan & Son, Glasgow, with powerful triple-expansion engines, which proved capable on trial of driving her at a most satisfactory speed. Both in the engine-room and on deck the most improved appliances have been fitted for the efficient and economical working of ship and cargo, and included Howden's forced draught, Weir's pumps and feed heater, Alley & M'Lellan's steam steering gear, Emerson Walker's steam windlass, &c. A complete installation of electric light, including a searchlight for the Suez Canal, has been supplied by Messrs. Martin & Co., Glasgow.

**Arcadia.**—On November 26th the steel screw tug *Arcadia*, the first of two useful additions to the old-established London towing fleet known as the Watkins Line, underwent her trial trip before being taken over from the contractors, Earle's Co., Limited, and Messrs. Cook, Welton, & Gemmell, of Hull, the former of whom have built the machinery, and the latter firm the hulls, of the two vessels. The *Arcadia* is a very fine craft, her dimensions being:—Length, 109 ft. 4 in.; beam, 21 ft. 6 in., by 10 ft. 6 in. depth; and her gross register is about 180 tons. She is equipped with all the latest requirements of a first-class sea-going tug, and has a set of steam steering gear, and a steam engine windlass beside the usual tow hooks and bridges, bollards, &c. Her machinery comprises a set of triple-compound three-crank engines of 600 I.H.P., having cylinders 14½ in., 23 in., and 37 in. diameter by 27 in. stroke, with patent reversing gear, and a large steel boiler made for a working pressure of 160 lbs. per square inch. When the vessel left Hull she had 30 tons of coal in the bunkers, which put her down to a draught of 9 ft. 1 in. mean, and the tests were made on a 30-mile course round the Newsand Lightship, when her manoeuvring capabilities were amply proved, and the engines, which were run at 110 revolutions, worked with the utmost smoothness, indicating the power above stated, and driving the vessel at a speed of 12 knots. Mr. William Watkins, jun., and Mr. J. M. Judd were present to watch the interests of the purchaser, the contract having been carried out under Mr. Watkins' superintendence. The result being quite satisfactory, the tug was brought back to Hull to make a few final preparations before leaving for London with the Shaw, Savill, & Albion Co's. four-masted sailing vessel *Mayfield* in tow.

**Cleves.**—On Wednesday, November 27th, the s.s. *Cleves*, built by the Sunderland Shipbuilding Co., Limited, for Monsieur Matthys, of Antwerp, was taken to sea on her official trial trip. The dimensions of the vessel are:—176 ft. between perpendiculars, by 29 ft. breadth, by 15 ft. 2 in. depth, classed 100 A1 at Lloyd's, under special survey, having raised quarter deck, bridge, and topgallant foreccastle. The captain, officers, and engineers, are all berthed under the bridge amidships, and the crew in the foreccastle. The engines are by Messrs. Westgarth, English & Co., of Middlesbrough, and have cylinders, 15½ in., 25 in. and 41 in. by 27 in. stroke, 160 lbs. working pressure, and include all the latest improvements. The trial was most satisfactory, the machinery working without a hitch, the mean speed obtained was 11.77 knots, the vessel being fully loaded. As soon as the trial was finished she proceeded on her voyage. This steamer has been specially constructed to carry 900 tons on 14 ft. draft, and on the very low net tonnage of 230. The hull and engines during their construction have been under the direct personal supervision of Mr. James Summers, M.I.E.S., of Middlesbrough.

**Telena.**—This vessel went on her trial trip on Wednesday, November 27th. She is a splendid steel screw steamer, built for Messrs. M. Samuel & Co., of London, for the bulk petroleum trade to the East through the Suez Canal, by Messrs. William Gray & Co., Limited, West Hartlepool. She is a sister ship to the *Peetan*, a report of whose trial appeared a short time ago, and it is not necessary, therefore, to give more than an outline by way of description in the present case. She and her sister ship are the largest bulk oil-carrying steamers afloat; her length over all being 388 ft.; breadth, extreme, 48 ft.; depth, 31 ft. 6 in. She has been built to Lloyd's highest class. There

are fifteen separate oil tanks, and when the oil has been discharged the tanks can be readily cleansed and adapted to receive general cargo by special means provided. The vessel is fitted throughout with an electric light installation by Messrs. Clarke, Chapman & Co., of Newcastle-on-Tyne, and in addition to this ordinary lighting arrangement, she has a 20-in. projector and the necessary lighting for navigating the Suez Canal at night. The pumps and ventilating arrangements are of the same complete character as in Messrs. Samuel's other steamers. She also possesses a powerful set of gear for dealing with general cargo, being capable of loading and discharging in similar time to that of a first-class cargo boat. She is also constructed to be able to carry dry and perishable cargoes together with others of a totally different nature, either liquid or solid at the same time without injury to either. The vessel is fitted with a powerful set of triple-expansion engines and boilers, which are located in the after part of the vessel, and have been supplied by the Central Marine Engine Works of William Gray & Co., Limited. The cylinders are 27½ in., 43½ in., and 73 in. in diameter respectively, and 48 in. stroke. The boilers are three large single-ended ones working at 160 lbs. pressure. The *Telena* is the eighth steamer built by Messrs. William Gray & Co., and engined at the Central Engine Works for Messrs. M. Samuel & Co., and as her machinery is of the most modern and economical type, and the vessel carries every facility for her special trade, she will undoubtedly prove a valuable addition to the already large fleet of her owners. The *Telena* left the harbour during the forenoon, having on board amongst others, Mr. Baggallay, of the firm of Flannery, Baggallay & Johnson, inspecting engineers, who have superintended the building of the machinery; Captain J. H. Murrell, representing the shipbuilders; Mr. Lindsay, representing the engine builders; and Mr. Richardson, of Madagascar. After adjustment of the compasses, the log was thrown overboard, and the engines opened out to their full extent, the speed registered by the log being 11½ knots, everything working with the utmost smoothness and giving the greatest satisfaction. On the conclusion of the trial the vessel at once proceeded on her voyage to Batoum to take in her first cargo of oil.

**Languedoc.**—Our French friends find themselves under the same necessity as English shipowners to keep their fleets up to modern requirements, and the *Compagnie Générale de Transports Maritimes à Vapeur*, of Marseilles, have been taking measures to keep pace with the times. Their steamer *Languedoc*, which was built on the Clyde in 1884, has been lying at the works of the Wallsend Slipway and Engineering Co., Limited, Wallsend, for the last few weeks, having her boilers removed and replaced by multitubular boilers of steel, to work at a pressure of 160 lbs., and her cylinders replaced by new ones of 24 in. and 63 in. diameter, by 42 in. stroke, &c., making what is now known as high-pressure compound engines, in accordance with the system of Mr. H. C. Ashlin, of Liverpool and London. The work has been completed several weeks in advance of the contract time, and on Tuesday, December 3rd, the vessel went her trial trip, which consisted of a continuous run off the coast of Northumberland of six hours' duration. The officials on board were Mr. Wallis, manager of the Wallsend Slipway Engine Works, representing the contractors, Mr. E. A. Cohan, of the firm of Messrs. H. E. Moss & Co., Liverpool, London and Newcastle, who are the agents for the owners in this country, and Mr. Daglish, of Mr. Ashlin's firm of Liverpool and London, who are the consulting engineers in England to the owners. During the whole of the trial trip the engines worked with the greatest smoothness, the full pressure being maintained whilst the ship accomplished a speed of upwards of 12 knots. After the trial trip the vessel went into Tyne Dock to load a cargo of coal for Marseilles, and she will at once sail for her port of destination. The *Languedoc* is the third vessel which the Wallsend Slipway and Engineering Co. have converted in this manner to the plans and specifications and under the supervision of Mr. Ashlin, the previous vessels being the *Mosser* and the *Colombo*, and the results have been most satisfactory—sufficiently so, indeed, to cause those who have had actual experience of the same to prefer this particular system of altering old compound machinery to the high-pressure compound type to the more expensive one of making them into three-crank triple-expansion engines.

**Howding.**—On December 4th the new screw steamer *Howding*, built and engined by Messrs. John Readhead & Sons,

West Docks, South Shields, to the order of Messrs. Bruns-gaard, Kjøsterud & Co., of Dram, was taken to sea on her official trial trip. The vessel is of the well-deck type, with full poop over raised quarter-deck, long bridge and topgallant fore-castle, and is of the following dimensions:—Length, 280 ft.; breadth, 39 ft.; depth, 20 ft. 8½ in. She has been built under special survey to take the highest class at Lloyd's and also of the Norwegian Veritas. Her engines are of the triple-expansion type, having cylinders 21 in., 35 in., and 57 in., and 89 in. stroke, steam being supplied by two large steel boilers, working at a pressure of 160 lb. per square inch. During the trial the machinery worked very smoothly, a speed of 12½ knots being attained over the measured mile. The vessel has been built under the superintendence of Mr. C. A. Bushell, of Newcastle, and Captain Salvesen will take command. After the trial the vessel proceeded to Sunderland to load a general cargo for Buenos Ayres.

**Wolviston.**—The new steamer *Wolviston*, recently built by Messrs. Ropner & Son, of Stockton-on-Tees, for Messrs. Webster & Barraclough, of West Hartlepool, took on board during last month a large cargo of machinery, &c., in Middlesbrough Docks, and the steamer having completed her loading was taken to sea on Saturday morning, December 7th, for her official trial run. She has a carrying capacity of 3,700 tons. The engines and boilers, supplied by Messrs. Blair & Co., Limited, are of 1,000 effective H.P., and during the trial worked satisfactorily. After the adjustment of compasses the *Wolviston* proceeded on her voyage to Kurraohee. The vessel has been built under the supervision of Mr. Newton, of West Hartlepool.

**Ilaro.**—On Saturday, December 14th, the fine steel spar deck screw steamer *Ilaro*, built by Sir Raylton Dixon & Co., Cleveland Dockyard, Middlesbrough, to the order of the African Steamship Co., London, went for her official trial trip in Tees Bay, under the command of Captain Murray. Her principal dimensions are:—Length, 322 ft. 6 in.; beam, 40 ft. 6 in.; depth, moulded, 27 ft. 11 in. The main deck is of steel, spar deck of iron, and the poop, bridge and fore-castle decks of yellow-pine. A saloon, with handsome accommodation for 12 first-class passengers and engineers is fitted up under the bridge, with house on bridge deck containing companion to saloon, smoke-room, and wheelhouse, and a large teak house above this for the use of the captain. The officers are accommodated in poop. Powerful triple-expansion engines have been fitted by the North-Eastern Marine Engineering Co., Limited, Sunderland, supplied with steam by two large single-ended boilers, working at 160 lb. pressure. The hull and engines have been built under the supervision of Captain Rattray and Mr. Stephenson respectively. The trial trip was most satisfactory, and at its conclusion the vessel left for Liverpool to load.

**Onda.**—The new steamer *Onda*, 5,300 tons, built by Messrs. A. & J. Inglis, Pointhouse, for the British India Steam Navigation Co., left the Queen's Dock on Friday morning, December 18th, at 8 a.m., completed her trials and adjustment of compasses, was delivered the same evening to her owners, and sailed on Saturday, December 14th, at noon, for Barry Dock, to complete her loading of coal for Bombay. The day was not favourable for a speed trial owing to the strong northerly wind, the vessel being only one-third loaded; but a speed of 11½ knots was obtained without difficulty, and the working of the machinery was considered highly satisfactory by the superintendents of the company, Captain Hodgkinson, R.N., and Mr. John Clark.

**Hanbury.**—After loading her first cargo at Tyne Dock the steel screw steamer *Hanbury*, recently launched by Messrs. The Blyth Shipbuilding Co., Limited, from their shipbuilding and dry dock works at Blyth, was taken to sea for her official trial trip last week in the presence of one of the owners, (Messrs. E. Stock & Sons, Bristol), and representatives of the builders and engineers (Messrs. Westgarth, English & Co.), and during trials of speed the machinery gave results satisfactory to all concerned. The *Hanbury* is an exceptionally smart vessel, and is designed to run in Messrs. Stock's line between Bristol, Rouen, &c., and has every recent improvement in the shape of machinery for effecting quick loading and discharging. After the customary toasts had been duly honoured, the vessel left for Boulogne amid the best wishes of the party present.

**Netite.**—This vessel is one of several steamers, Messrs. Sir William Armstrong, Mitchell & Co. are building to the order of Messrs. M. Samuel & Co. as additions to their already large fleet of steamers specially constructed for the conveyance of petroleum in bulk to the far East, and suited for general cargo of every variety on the homeward passage. The difficulty at first experienced in attaining this object has been now practically solved for some time past. She has just been completed, having been inspected during her construction by Messrs. Flannery, Baggallay & Johnson, of London and Liverpool, Messrs. Samuel's consulting engineers, and was taken for trial on November 28th off the Tyne. The trial throughout was most satisfactory, the whole of the machinery which is in these ships is of a more complicated character than usual, working without the least hitch and giving no anxiety to those in charge. Her auxiliary machinery quite apart from the main engines comprises a large set of steam winches capable of competing with those of a first-class cargo steamer, in discharging the vessel, or of handling the ship. Duplicate sets of powerful pumps for dealing with liquid cargoes, large ventilating machinery, special heating apparatus, portable pumps for various purposes, usual powerful steam windlass, steam steering gear and powerful electric light plant for lighting the ship throughout, or for handling dangerous cargoes at night, with 20,000 candle-power search-light, for use either in canal or in crowded waters. Her dimensions are:—Length, 375 ft. 6 in.; breadth, 48 ft.; depth, 81 ft. 6 in., with engines having cylinders 27½ in., 43½ in. and 78½ in., by 48 in. stroke, steam being supplied for them by three large single-ended boilers working at 160 lbs. pressure. The machinery has been constructed by the Wallsend Slipway Co., under special survey, and the run to Dover after the trial occupied only 24 hours, in spite of adverse weather, everything running quite smoothly.

## Reviews.

*The History of North Atlantic Steam Navigation.* By Henry Fry. London: Sampson Low & Co., Limited. 1896.

YET another contribution to the literature on this most fascinating subject. It in many respects differs from those previously given to the world. It is written by a man who cannot be in his first youth, for he is proud, and rightly proud, of the fact that he saw the first Atlantic steamer launched. He has kept careful notes for years, and this fact appears on every page of the work. Previous writers have skimmed lightly over the surface and revealed only what companies told them, or what they could get out of the correspondence columns of daily shipping papers. One can see that Mr. Fry has made contemporary notes, and that he has taken little on trust. He claims accuracy as the chief merit of his work, and he gives an enormous number of facts and dates and his errors are not numerous. Those that he makes are generally either slips of the pen—as, for instance, his statement that the Cunard steamer *Tarifa* was lost on the Tuskar: here he confused two names:—or a want of microscopic care in searching the current shipping papers. No one can watch such a big and scattered industry as the shipping trade and not occasionally fail to note something. As an example of this we may cite his statement that the *Helvetia's* loss was a National Co.'s disaster. The fact of her loss, and the date thereof, are correctly stated, but Mr. Fry had failed to note that the company had parted with her some time previous to her end.

Still we have found several errors besides these, and some even in his account of the premier Atlantic Line. Thus we find that Mr. Fry mentions the commencement of the call at Queenstown in the year 1859 quite correctly. But he goes on to say: "Soon after they abandoned Halifax, and all their mail boats ran direct to New York, but they built a smaller and slower line of screw boats to run direct to Boston without subsidy. Among these were the *Andes*, the *Alps*, the *Atlas*." If the matter be gone into it will be seen that the date of the *Andes* and the *Alps* was long anterior to the time he speaks of. Again, after describing the *Serria*, the writer says: "But now two great naval architects had come to the front and designed ships which almost took one's breath away." (These were Sir Edward Harland and the late Sir William Pearce.) "Both," says Mr. Fry, "insisted upon greater length of hull, high pressure steam and triple cylinders;" he also uses the expression "triple cylinders" in

reference to the *Servia*. This might imply that the *Servia* had triple-expansion engines. These she of course had not. We know that in compound days the Fairfield yard used to turn out its big mail boats with three cylinder engines driving three cranks; that the *Arizona* and the *Alaska* had these; that the design was also followed by the great Clydebank firm in the *Gallia*, the *Servia* and the *Aurania*, and we therefore may take the expression to mean three cylinder compound engines. If it means that it is not true that Sir Edward Harland insisted upon it until he adopted the triple-expansion type with three cylinders and three cranks, the four cylinder compound type was adopted by the Belfast yard for the White Star boats. This is, perhaps, an inaccuracy of a trifling character, as is the statement that the *Algeria* was transferred to Guion's before she became the *Pennland*.

In speaking of the arrangement of the twin screws of the big White Star and Cunard boats, the author tells us that "the Cunard boats have an aperture in the stern frame, similar to that in a single screw ship, in order that the screws will work more freely." If he will regard his own preceding paragraph he will see that the White Star boats have this aperture too, "for by their arrangements," he says, "the propellers, if found too small, may be increased in diameter by overlapping them."

At page 131, Mr. Fry gives a terrible but not much exaggerated account of the trials and troubles of a crossing in the early days. When the passengers who went in for the not so prevalent custom of smoking tobacco had to use the fiddle—not the "fiddle," as the author calls it—as a smoke-room. But it is a little unfair to compare these bye-gone troubles with the luxuries attainable in the new Inman and International vessels. A gap of twenty-five years separated the two periods, the end of the first period from the commencement of the second.

Rather more attention is given to the financial aspect of the various companies in the present volume than has been given in its recent predecessors. As is natural to a Canadian writer, the lines to the St. Lawrence have special prominence. The Continental lines are also not forgotten. There is an appendix, with details of the present vessels in the trade, and with a map of the North Atlantic. Notes are also given, containing various newspaper extracts upon the contemplated improvements in Liverpool (now accomplished facts), upon the great run of the *Lucania*, and upon the memorable salvage of the passengers and crew of the *Danmark*.

In conclusion, we would recommend this volume to those who are interested in the historical facts relating to Transatlantic Navigation. A vast assemblage of dates and facts are here presented, and though some of them are, as we have shown, incorrect, there are a vast majority that we know to be accurate. Only those who have engaged upon such work as this know the difficulties to be met with, the unreliable statements encountered and the *suppression veri* of the companies. The work is enough to frighten any one from going on with it, when he once realises the pitfalls with which he is surrounded. We must, therefore, make every allowance for the few errors that have crept in.

The book is well illustrated and the illustrations are of considerable interest.

**A Handy Ready Reckoner for Wages and Casting Purposes.**  
Compiled and published by K. Openshaw, Wyke Regis, Weymouth.

This is a useful little publication for those whose duty it is to make out wage-sheets and such matters. It is based on a week of fifty-four working hours. By it we can see at a glance the amount payable in respect of every period of hours, from one to three hundred in combination, with any rate of wages from three shillings up to two pounds a week. The volume is clearly printed on large paper, and will no doubt prove itself very valuable to those for whom it is intended.

**Drawing and Designing for Marine Engineers.** By Charles W. Roberts. London: The Tower Publishing Co. 1895.

This present book is designed as a guide for those who contemplate trying for the Board of Trade engineer's certificate. The volume contains a very large number of well-executed and clear drawings of important parts of the machinery of steamships as examples for the student. The aim of the book, however, is somewhat larger than that of some other works which have been put forward for the purpose of assisting the student to pass his Board of Trade examination. The author seeks to enable those who have not had the advantage of passing through the drawing office of an engineer's works to remedy

that defect as thoroughly as may be. For that purpose the drawings are accompanied by something like two hundred pages of letter-press, in which an explanation is afforded of the various instruments used by the draughtsman, and the best methods of applying them. It is also shown how simple elementary geometrical problems, which confront the beginner as soon as he commences his work, may be overcome. Then follows a clear and concise explanation of the theory of projection as affecting the engineer student, and after that we are to suppose that an order has been received for a set of marine engines, and that the reader has to set about the work of making the drawings. He is told where to begin, and what are the parts most necessary to settle, and most requisite to set in hand at once. To enable him to arrive at the power of engine needed to do the work contracted for, he must grasp Dr. Kirk's method of analysing the form of the vessel and the I.H.P. which will be necessary to drive her at the required speed. The explanation of this system is borrowed, with proper acknowledgment of the obligation, from Mr. Seaton's "Manual of Marine Engineering." Then the size of the cylinders has to be arrived at, and from these sizes the dimensions of the various other parts of the machinery must be deduced. In working out these problems a number of rules are given and the practice of various firms as to the material, shape, and method of finishing the various parts are given. A good deal of attention is naturally given to the propeller, and the auxiliary machinery is not forgotten. The details of the boilers are looked into, and the Board of Trade rules pertaining to them are set out at length. In an appendix will be found a table of Whitworth screws, which will certainly be useful.

The whole book is one which is well designed for the needs of the student. Its plan is good, for it begins at the beginning, and, taking nothing for granted, proceeds through the whole of the work in an ordinary job of building a set of marine engines and boilers. It is written by a practical man who has gone to the most recent sources for his data, and one who shows himself to be acquainted with the most recent practice. It should certainly prove of great value to those engineers who have not had the advantages which a period of work in a drawing office afford.

### Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from November 14th to December 10th, 1895.

- |       |   |
|-------|---|
| 21610 | J. A. Richards. Metallic rings.   |
| 21622 | J. W. Mellings. Valves.   |
| 21657 | F. C. Crawford. Submarine telegraph cables.                                   |
| 21672 | D. C. Hutton. Furnace bars.   |
| 21696 | J. Edge. Gas and oil motor engines.   |
| 21725 | J. W. Bowley and W. O. Williamson. Boiler furnaces.                           |
| 21754 | E. Maurice. Safety valves.  |
| 21799 | W. Schmidt. Flame-tube boilers.   |
| 21839 | M. F. M. Mulready. Furnace grates.  |
| 21859 | J. Shaw. Ventilating ships.   |
| 21867 | S. E. Howell. Metallic tubes.   |
| 21869 | S. Boswell and T. J. Carter. Lubricators.                                     |
| 21909 | P. R. Woldike. Wave motor.  |
| 21913 | W. T. Lord. Boat propulsion.  |
| 21916 | E. J. Clubbe and A. W. Southey. Rotary engine.                                |
| 21917 | E. J. Clubbe and A. W. Southey. Ball bearings for shafts.                     |
| 21957 | J. Howden. Steam boilers.   |
| 21961 | C. Leggat. Diving armour.   |
| 21964 | G. W. Hawkesley. Superheating of steam.                                       |
| 21963 | E. M. Mallett. Generators for steam boilers.                                  |
| 22005 | J. J. Bush. Steam generators.   |
| 22018 | T. Monks. Obtaining power from the tide.                                      |
| 22049 | J. C. B. Okes. Water-tube boilers.  |
| 22069 | M. W. Swinburne, C. Swinburne, and F. Gill. Side scuttles or ports for ships. |
| 22189 | J. Ferguson. Feathering ship propellers.                                      |
| 22190 | W. T. Melvor. Furnaces of steam generators.                                   |
| 22220 | A. Schermer. Steam heating apparatus.   |
| 22252 | A. B. Blackburn and T. L. Boyden. Motor generators.                           |
| 22290 | H. McIntyre. Paddle wheels of steamers.                                       |
|       | Heating steam engine cylinders.   |

- 22313 W. A. Sissons. Trawl port for steam trawlers.  
 22314 W. A. Sissons. Trawl port for steam trawlers.  
 22317 H. R. Chubb. Tightening gland packing.  
 22345 E. A. Ashcroft. Apparatus for generating steam.  
 22386 G. Kynoch & Co., and E. Jones. Steam traps.  
 22414 S. J. Levi & A. J. Jones. Automatic indicator.  
 22428 F. Friedenthal. Ships' propellers.  
 22430 T. D. Lichtenstein. Vessels.  
 22431 R. B. Bevis. Feed-water apparatus.  
 22453 C. B. Bean. Sliding rule or gauge.  
 22473 C. E. Hogg. Oars.  
 22485 T. Hughes and H. E. A. Digby. Valves, &c.  
 22497 F. H. Storm. Boats' davits.  
 22549 C. E. Kelway. Propelling boats and barges.  
 22550 The Monitor Water Purifier Co., and C. H. Snyder. Heating feed-water.  
 22557 W. Bailey. Chucks for lathes.  
 22588 E. B. Caird and T. J. Rayner. Relief valves.  
 22604 W. P. Thompson (F. Kaeferle, Germany). Governor for steam.  
 22607 H. Schlotfeldt. Speed gauges.  
 22609 H. Smith, H. Smith, jun. and O. Smith. Bending plates.  
 22612 A. G. Noack. Air compressors.  
 22616 J. G. Lorrain (T. G. Rennerfelt and R. Lundell, United States). Pumping apparatus.  
 22618 J. E. Culver. Steam boilers.  
 22623 J. G. Lovering. Nautical sounding apparatus.  
 22626 C. McWhirter. Suspending hammocks to ships' beams.  
 22628 W. M. Huskisson. Rotary turbine engines.  
 22630 B. Haigh. Boilers for circulating water.  
 22649 H. Pickstone. Valve gear of pumping engines.  
 22656 E. Makin, jun. Steam generators.  
 22671 W. A. Ayres and H. P. Ranger. Firebars.  
 22712 J. H. Dunn and R. G. E. Dalrymple. Generating steam.  
 22745 C. A. Hinchliff. Packing for steam joints.  
 22747 J. Hargreaves. Hydraulic actuating valves.  
 22766 A. Case. Pistons for steam, &c., engines.  
 22770 L. Rushworth and A. Fletcher. Lubricator.  
 22773 J. Weir. Water gauges for steam boilers.  
 22807 P. Jensen (Hoyer and Glahn, Germany). Fixing metallic tubes.  
 22821 W. Hay. Direct-acting pumps.  
 22822 H. G. Cordes. Trawl nets for sea fishing.  
 22827 J. Roots. Internal combustion engines.  
 22848 E. Frost. Coupling for flexible shafting.  
 22856 F. Turse. Water-tube steam generators.  
 22884 F. R. Brown. Propulsion of marine vessels.  
 22944 E. M. Griffiths and J. Mills. Water level indicator.  
 22949 E. Howl and W. W. Attwood. Direct-acting engines.  
 22969 J. Bonner, C. W. Mott, and H. Hermansen. Vessel-steering apparatus.  
 22975 W. Rowbotham. Heat generating engines.  
 22979 W. Pilkington, C. T. Bishop, and A. Pilkington. Seam-less tubes.  
 22997 T. Edington and R. Barr. Ships' boats.  
 23021 W. R. Skyes, sen. Valves for water, &c.  
 23033 C. H. Gray. Valves.  
 23044 P. F. Oddie and G. Hesse. Pumping engines.  
 23056 O. Hartwich. Ships.  
 23069 F. Maier. Preventing the sinking of ships.  
 23072 T. B. Smith. Water pressure feeders.  
 23154 E. M. Hedley. Metallic packing.  
 23196 J. E. Gresty. Metal tubes.  
 23198 F. Reddaway and F. Reddaway & Co. Edgings for beltings.  
 23199 G. Longworth. Supplying fuel to furnaces.  
 23247 H. Leps. Model warship.  
 23254 T. R. E. and O. J. Meacock. Steam pumps.  
 23271 J. Southorpe. Aiding combustion in furnaces.  
 23288 M. E. Dunscombe. Pressure regulator.  
 23290 J. Denning. Ventilation of ships' holds.  
 23302 J. E. Schlieper. Steam boilers.  
 23329 A. E. Varreiter and E. Mullendorff. Valves.  
 23353 J. Watson. Pumps.  
 23378 J. Taylor. Pumps.  
 23447 F. L. Croft. Friction clutches.  
 23510 S. A. Johnson. Feed-water heater and steam generator.  
 23517 H. L. vey. Self-acting horse-power engine.

- 23582 N. Downing. Fixing plates in furnaces.  
 23535 J. H. Gibson. Ships' ventilation valves.  
 23547 W. Schmidt. Marine steam generators.  
 23548 T. S. Forster. Anchors.  
 23609 D. Bailey. Regulators for steam engines.  
 23615 H. A. Wheeler. Condensers.

## BOARD OF TRADE EXAMINATIONS.

NOTE.—1C denotes First Class; 2C, Second Class.

November 23rd, 1895.

- Adams, G. S. . . 2C Aberdeen  
 Alexander, W. . . 2C Glasgow  
 Beath, J. H. . . 1C "  
 Blair, A. . . . 1C "  
 Blair, D. K. . . 1C London  
 Blanchard, W. . . 2C W. Hrtpl  
 Blenkinsop, T. . 1C N. Shields  
 Boyd, A. E. . . . 2C Cardiff  
 Campbell, A. . . 1C S'th'pton  
 Caras, J. T. . . . 2C Sun'land  
 Cooke, H. A. B. 1C Liverpool  
 Cree, A. . . . . 1C Glasgow  
 Crombie, C. M. 2C Aberdeen  
 Cullon, W. . . . . 1C Glasgow  
 Evitt, A. . . . . 1C "  
 Ferguson, J. . . 1C London  
 Forbes, C. W. . . 2C N. Shields  
 Frost, S. H. . . . 2C London  
 Gebbie, H. . . . 2C Glasgow  
 Glacken, G. . . . 1C Cardiff  
 Horsfield, R. . . 2C Aberdeen  
 House, S. . . . . 2C S'th'pton  
 Huntley, B. . . . 2C W. Hrtpl  
 Johnston, W. . . 2C Aberdeen  
 Lillystone, H. . . 2C W. Hrtpl  
 Low, W. . . . . 2C N. Shields  
 Lyle, R. W. . . . 2C London  
 Macfarlane, J. . 2C Glasgow  
 Marshall, C. W. 2C N. Shields  
 McPherson, T. 2C Sun'land  
 McPherson, W. 2C N. Shields  
 Mercer, J. H. . . 1C W. Hrtpl  
 Milne, W. S. . . 2C Aberdeen  
 Morris, T. A. . . 2C London  
 Nichols, W. W. 2C N. Shields  
 Parkyn, C. C. . . 2C Cardiff  
 Pattison, G. . . 2C N. Shields  
 Robertson, W. . 2C Cardiff  
 Selkirk, J. K. . . 2C N. Shields  
 Sim, J. . . . . 2C Aberdeen  
 Simpson, S. . . . 1C W. H'pool  
 Smith, A. . . . . 2C Glasgow  
 Smith, James. . 1C N. Shields  
 Stepenson, T. . . 2C Liverpool  
 Thorburn, J. . . 1C Glasgow  
 Towers, E. . . . 2C Cardiff  
 Turner, W. H. . . 2C "  
 Wilson, E. . . . 2C N. Shields  
 Wood, F. N. . . . 2C Cardiff  
 Wood, J. T. . . . 2C N. Shields  
 Woodward, A. . . 2C Sun'land  
 Wymer, G. . . . 2C London

November 30th, 1895.

- Addison, W. . . 1C Liverpool  
 Atherton, E. . . 1C London  
 Breden, F. C. . . 2C "  
 Cartledge, W. . . 1C Liverpool  
 Dead, W. . . . . 2C London  
 Lamplough, W. 2C Hull  
 Philin, E. J. . . . 2C London  
 Ray, H. J. . . . 2C Liverpool  
 Shaw, J. W. . . . 1C "  
 Stark, J. Y. . . . 2C London  
 Whiteleys, J. H. 2C Liverpool

December 7th, 1895.

- Anderson, H. J. 1C Liverpool

- Bentham, J. . . . 2C Hull  
 Black, J. . . . . 1C "  
 Brown, David . . 1C Glasgow  
 Brown, W. B. . . 2C N. Shields  
 Bruce, Archie. . 1C Glasgow  
 Burdes, Alfred 2C N. Shields  
 Cameron, Peter 2C "  
 Carrie, William 1C London  
 Coulling, E. H. 1C Hull  
 Cranmer, J. . . . 1C London  
 Crawford, J. . . 2C Glasgow  
 Cuninghame, J. 2C "  
 Daly, John . . . 2C "  
 Dickson, R. R. . 2C London  
 Dobbyn, Loftus 1C N. Shields  
 Downward, T. 2C Liverpool  
 Eggleston, S. . . 2C N. Shields  
 Fitzjohn, Frank 1C London  
 Glentworth, H. 2C Hull  
 Heard, C. F. . . . 2C Liverpool  
 Hirst, E. M. . . . 2C N. Shields  
 Holmes, T. F. 2C London  
 Hopkins, A. L. 1C Cardiff  
 Jones, J. . . . . 2C "  
 Kendall, R. W. 2C Hull  
 M'Caig, David. . 2C Glasgow  
 Melekos, D. . . . 1C Cardiff  
 Milburn, A. E. 1C N. Shields  
 Milburn, R. . . . 2C "  
 Morris, G. S. . . 2C London  
 Morris, Thomas 1C N. Shields  
 Oliver, J. W. . . 2C Cardiff  
 Rogers, Walter 2C "  
 Scott, Thomas, 2C "  
 Smart, J. B. . . . 2C London  
 Strang, Francis 1C Glasgow  
 Walker, James 1C "  
 Watt, Percy . . 2C London  
 White, Magnus 2C N. Shields  
 Whyte, Robert, 2C Glasgow  
 Wilson, J. . . . 2C Liverpool  
 Winchcombe, A. 2C Glasgow  
 Wymer, C. R. . . 1C London

December 14th, 1895.

- Alderson, H. . . . 2C W. H'pool  
 Anderson, G. . . 2C Greenock  
 Calvert, H. A. . . 2C W. H'pool  
 Cannon, P. C. . . 2C London  
 Craig, J. C. . . . 2C "  
 Dutton T. . . . 1C Aberdeen  
 Harvie, A. . . . 1C Greenock  
 Hepburn, J. . . . 2C Leith  
 Hodgson, M. . . . 2C Dublin  
 Jeffery, M. . . . 1C Liverpool  
 Love, A. . . . . 1C Greenock  
 McClure, S. . . . 1C Dublin  
 Merryweather A 2C W. H'pool  
 Middleton, G. . . 2C Greenock  
 Moon, W. H. . . . 1C "  
 Roberts, W. . . . 1C London  
 Rowlands, F. W. 2C Liverpool  
 Sinclair, F. . . . 2C Leith  
 Smith, F. W. . . . 1C "  
 Strachan, J. . . 1C Liverpool  
 Walsh, P. . . . 2C W. H'pool  
 Watt, T. . . . . 2C "  
 Watterson, T. . . 2C Dublin  
 Whyte, J. . . . . 1C Leith



# The Marine Engineer.

LONDON, FEBRUARY 1, 1896.

THE evolution of the water-tube boiler is proceeding apace. We have just discovered at last that we know very little about it. There is always hope for scientific progress when those occupied in research have reached the solid vantage ground of being able to define that which they admit they know very little about. Mr. Yarrow has again deserved well of the whole community of engineers, in that he has, with great elaboration and ingenuity and at considerable expense, been able to point out where the theorists have been building their theorems upon fallacies. We would wish to be amongst the first to admit that we fully believed in the convection theory of heat, as generally understood, and that in the case of a U tube of water connected at the top to form a circulating system, we should have considered it to be a certainty that were heat to be applied to either side of such U tube under any circumstances that steam generated would rise in such leg as was exposed directly to the heat, and that with such rising of the steam, the water also would ascend from the point of contact of the external heat. Mr. Yarrow has, however, by his experiments, proved without a doubt that this belief is not in accordance with facts under certain conditions, and has actually shown the generation of steam in one leg of such U tube, when subject to the application of external heat, and the bubbles and surrounding water, actually descending in such tube instead of ascending. The normal conditions of steam and water ascending from the source of heat appears to occur, in the first place, when the water in the circulatory system is at rest and without preliminary circulation, but once a definite circulation has commenced in one direction the application of heat to the pipe containing the downward flow of water does not in any way retard the velocity of the descending current, but on the contrary stimulates it, and the bubbles of steam are carried with the downward flow of water from the source of generation. Thus all the precautions so generally taken to consider all vertical heated tubes to necessarily contain an upward current of water and steam is proved to be a definite fallacy, and it appears that any one of such vertical heated tubes may at any time become a down-coming tube receiving as great a stimulus to the downward current from the external heat as if the current were ascending. What is the explanation of this phenomenon? It is evidently a dynamic explanation. When once the circulation of the water is

determined in a specific direction, the action of the bubbles of steam upon such current is apparently almost infinitesimal, whereas the action of the water current upon the steam bubbles is very great. This, upon consideration, is not much to be wondered at, the relative density of the steam bubbles is infinitesimal as regards the surrounding water. The buoyant resultant of the water upon the steam bubbles, which is looked upon as causing the usual vertical movement of such bubbles, must produce an equal and opposite reaction upon the supporting water. Once the supporting water is in downward motion, the reaction is neutralized. It is probable that the rapid ascent of steam bubbles which is noticeable in an open glass vessel heated at the bottom, and is also noticeable in the leg of the Yarrow U tube in which the water is ascending, is due to the rapid ascent of the surrounding heated water, rather than to the buoyant ascent of the bubbles relatively to the water. This would explain how the rapid descent of water in a vertical heated tube would entrain the steam bubbles with it. But we still want an explanation of how the heat accruing to the downward flowing stream can tend to accelerate the downward flow. A curious phenomenon has been observed in this case, that as the bubbles descend they disappear, and thus utterly lose their relative buoyancy. This would account for their passive motion with the descending current, but not for any aid thereto. We think this explanation must be sought in the fact that the lower part of the U tube is an inverted syphon, and thus the excess heating of the descending column of water, and the disappearing steam bubbles therein, all promote the lighter specific gravity of the water in the ascending leg of the U tube, and the sudden regeneration of steam again in the ascending leg of the U tube, as the head of water decreases, all tend to produce an accelerated ascending effort in the ascending tube, which must necessarily be reproduced in every part of the circulating system, and even in the descending leg, where the acceleration downwards has such an abnormal appearance.

MR. YARROW's experiments have also reproduced the very little understood phenomenon of "priming." When the bottom of the U tube was connected at the lower joint with a down-comer pipe from the upper uniting tank, we have what would be recognized as a typical system of two ascending and one down-comer pipe to supply cold water to the two ascending legs of the U tube. When Mr. Yarrow carried this idea out, by applying heat to both the ascending legs of the U tube and carefully avoided heating the down-comer tube, he got an alternate rush or pulsation of steam up either side of the heated U pipe, alternately the

steam carrying the water with it, or being accompanied by a rush of water as in priming—curiously enough Mr. Yarrow found that by heating the “down-comer” pipe as well as the legs of the U pipe he obtained increased acceleration of circulation, and without the disturbances of the alternate priming pulsations. This would appear to indicate that priming may be largely due to the contact at a place of heating of currents of water at too diverse a temperature to one another, such as would be exactly reproduced by a comparatively cold stream of feed water infringing upon the most highly heated evaporating plates of a boiler. Apparently, the greater the uniformity of the relative heat of the streams of water circulating about the most highly heated evaporating plates of a boiler, the less the tendency to prime. As a general result, from Mr. Yarrow’s experiments it would appear that water-tube boilers at any rate adapt themselves wonderfully to a rapid circulation, even where all surfaces are exposed to a uniform heat, if you will only leave the water free to adopt its own path without obstruction. Circulation seems to increase fairly uniformly with every increment of heat that the water can be made to take up, irrespective of the manner or position in which the heat is applied. A straight tube for water-tube boilers seems, as regards its adaptation to a good circulation, the best possible, as affording least resistance to the current, and the boiler seems to know far better than the designer how many tubes it wants for down-comers, and how many for up-casts. We shall, in a following issue, give detailed accounts and illustrations of these most interesting experiments.

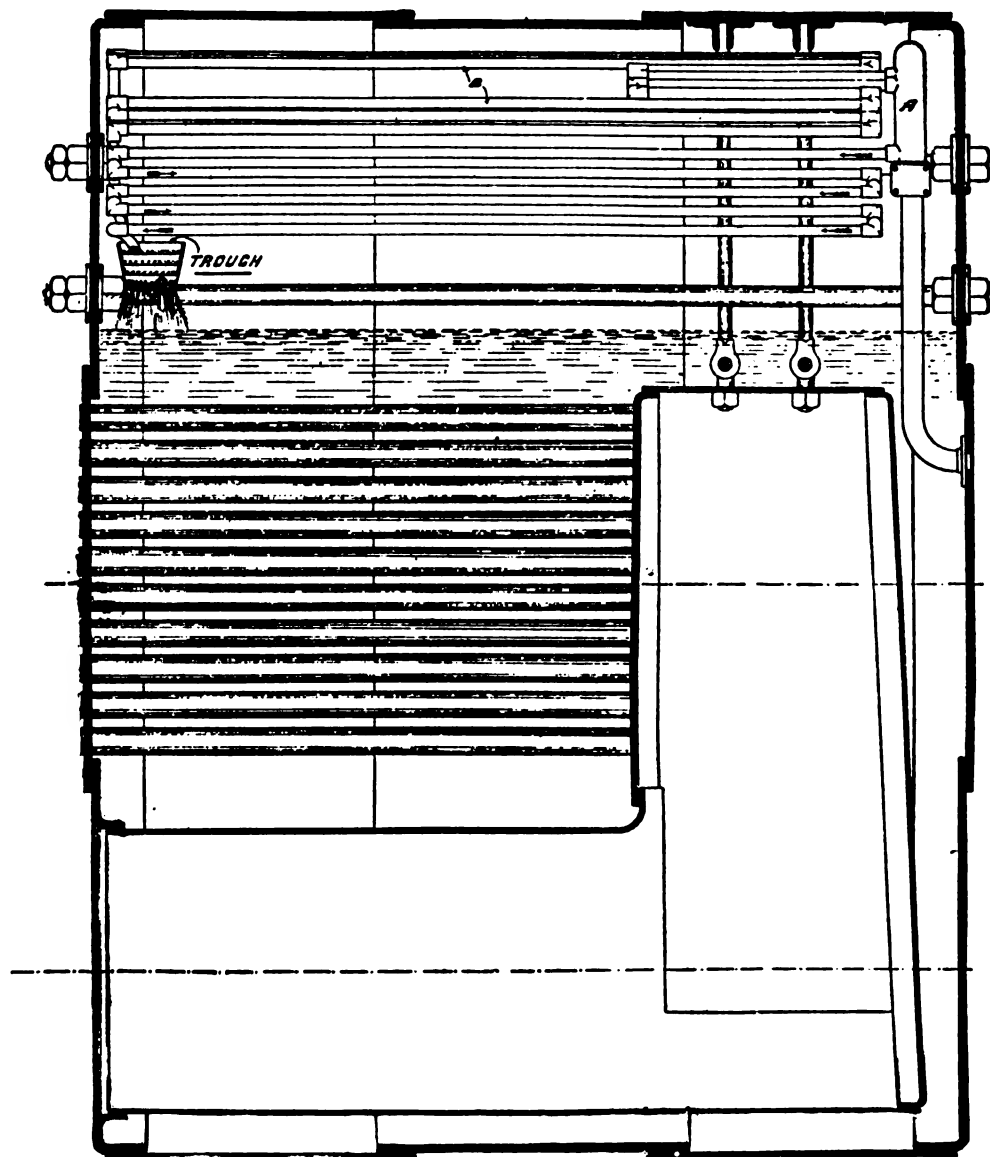
In warship design we are still without a practicable construction which will give inherent buoyancy to a water-logged vessel when perforated below the water line, or which will prevent an undue rush of water through the hole caused by the passage of a shot through the plates at or under the water line. A good deal in this way was expected from the adoption of woodite, but we have not heard of any general acceptance in a serious sense of this material. It appears now that other materials are being subjected to exhaustive tests in the United States as rivals to woodite, claiming as they do to combine the buoyant and the self-closing properties in one material that was evinced only in two distinct forms of woodite. These materials are cocoa-fibre cellulose and corn-pith cellulose, of which the latter has much distanced the former, and seems amply to fulfil all requirements. The cocoa-fibre cellulose is compressed to 7.7 lbs. per cubic foot, and the corn-pith cellulose to only 6.5 lbs. per cubic foot, which both give great buoyancy as against the weight of 62½ lbs. of a cubic foot of water.

These materials have been tested against one another as to power of self-closing an aperture formed by the passing of a shot. A cofferdam was prepared of ¾ front plate, with 3 ft. thickness of fibre packed behind, held up by a 1½ plate. A 6-in. shot, with a velocity of 1,000 ft. per second, was fired through such a cofferdam, packed with the cocoa-fibre and with the corn-pith cellulose for comparison, and subjected afterwards to a small head of water above the passage forced by the shot. In this case in about 10½ minutes a drop of water appeared through the cocoa fibre, and thereafter a flow at about half a gallon a minute ensued. In the case of the corn-pith cellulose no water made its way through the closed aperture at all, though subjected to the pressure of 5 ft. head of water for about 1½ hours. Then an 8-in. shot was fired through the materials with the result that flow of water commenced to the ultimate extent of 1½ gallons per minute, in 25 seconds through the cocoa fibre, but again failed to get through the corn-pith cellulose. A further important property of the corn-pith cellulose is that it will not fire from an exploding shell, but only chars about the point of explosion. As it is of the utmost importance to give the best protection against leakage with least additional weight to the comparatively unarmoured cruisers that are now forming so important a part of our warships, it would appear that the use of the new corn-pith cellulose for the purpose is well deserving of attention by the Admiralty.

In spite of the refusal of the Tramway Co. shareholders to allow the purchase money, paid to them by the County Council, to be re-invested in a new Thames River Steamboat Co. the idea of a revivification of the ancient passenger traffic upon the Thames is not yet outside practical politics. It is the County Council themselves that are now discussing the advisability of becoming steamship owners on the River Thames, and thus to restore its pristine importance as a highway for passenger traffic. We have no sympathy ourselves with grandmotherly government, and particularly when such government is proposed to be carried out with other people’s money, but we rather imagine the County Council will have to buy their commercial experience, as individuals have had to do before them. There is no doubt that the idea of a handsome service of saloon steamboats upon the River Thames is a fascinating one for those who regard rather the credit of our metropolis than the cost at which such credit is obtained. Those also, few though we fear they are, who by preference or necessity use the river for their journeys from East to West, or *vice versa*, will much appreciate an increase in the luxury of accommodation provided, if offered at a similarly small tariff as hereto-

fore, though other ratepayers not partaking in the added luxury may doubt the advisability of having to pay for it. We fear all streams of passenger traffic are now controlled by the two considerations of time and cost, rather than by abstract questions of fresh air, of pleasantness, and in both of these considera-

as would suffice to accomplish the whole journey by rail, or even a short journey by omnibus. No acceleration of the speed of the river steamboats would appear to be possible in our crowded river, so that not much time can be saved in that way. As Mr. John Burns appears to be taking a prominent



THE "VICTORIA" PATENT FEED WATER HEATER. FIG. 1.

tions river steamboat traffic will have a poor chance in competition with the railway and bus accommodation parallel to the Thames. It would appear to be impossible to bring the river landing-stages any closer or more accessible to the main East and West City thoroughfares, and consequently as much time is lost in the journey to and from the main arteries of traffic and the landing-stages on the river,

part in the action of the County Council in the investigation of this matter, perhaps the needs of the residents of Battersea are prominently before his mind, or perhaps it is further employment for the unemployed that forms the motive cause. As we presume a new fleet of steamers would be an essence of such an undertaking we must not look too sceptically at the probabilities of commercial success.

### THE "VICTORIA" PATENT FEED-WATER HEATER.

THE accompanying illustrations show an arrangement of this successful feed-water heater as applied to marine boilers.

The invention of Mr. Adam Miller, whose agents

demonstrate its simplicity, ready adaptability and certainty of action, and from these it will be seen that the heater proper consists of a series of coils of longitudinal tubes B, three or five lengths of which are connected together, *vide* sketch. These tubes are supported at each end and held in place by circumferential strips of metal secured to the roof plates of the boiler (these strips are not shown in our

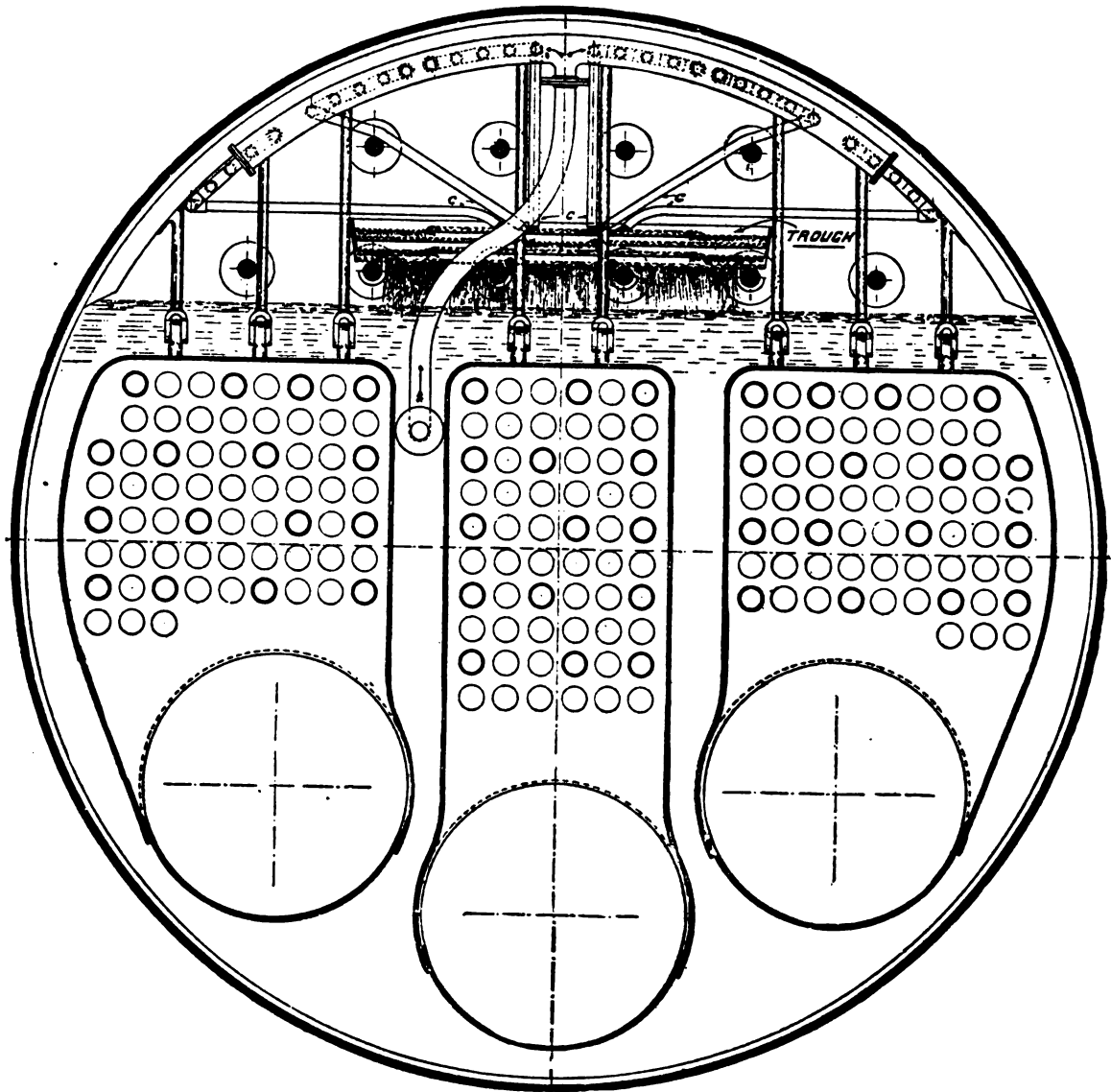


FIG. 2.

are Messrs. Sanders, Wake & Co., of 3, Crosby Square, London, E.C., the "Victoria" feed-water heater has now been fitted in over twenty vessels with, in every instance, the most satisfactory results, two of the steamers fitted, namely, the *Ocean King* and *Albireo*, showing a saving of 25 per cent. in coal and an increase of speed since its installation.

A reference to the illustrations, of which Figs. 1 and 2 are respectively longitudinal and cross sections of a boiler, showing the feed-heater *in situ*, will serve to

illustrations) and four of the tubes, two in each of two contiguous groups, are left short, as shown in Fig. 1, to allow a free passage to or from the man-hole.

An internal riser pipe is connected at its lower end to the feed-check valve (or it may be provided with a separate check valve), and at its upper end to the T-like coupling of a circumferential pipe A, preferably of copper or brass, and which is carried by suitable connections projecting from the end plate of the boiler.

The groups of tubes are each connected at one of their ends to the circumferential pipe A, and have their other, or open ends C, C, curved in such a manner as to bring the openings over the trough. This latter is secured, as shown in Fig. 2, to four of the longitudinal stays, and has its bottom plate perforated, so as to ensure an equable distribution of the feed over a large area.

The feed entering the riser branches right and left along the circumferential pipe A, as shown by the arrows in Fig. 2, and traversing the tubes, B, B, in the manner shown (see arrows, Fig. 1), finally falls from the open ends into the trough.

As the whole of the parts are in the steam space of the boiler (a very small proportion of which they occupy), it follows that the feed reaches the main body of water in the boiler at a very high temperature, thus ensuring great economy in generating steam, all the heating surfaces being left free for steam production and not in any way cooled by incoming cold feed, whereas in the ordinary way the flame cannot come into contact with the surfaces around the feed injection, and the heat passes away unused. It also obviates all risk of injury to the boiler caused by the unequal expansion and contraction due in the ordinary way to pumping in large dense volumes of comparatively cold feed-water in the vicinity of the hottest parts.

As will be seen from the illustrations, the whole appliance is strong and simple, and when once fixed requires no further attention, nor does its presence interfere in any way with the inspection or cleaning of the boiler.

The s.s. *Gogo* was the first vessel fitted with these heaters, now about four and a half years ago, and a recent inspection of her boilers failed to disclose any galvanic or other deleterious action. The owners of this vessel certify to 25 per cent. saving of coal, and 8 per cent. increase of speed since fitting the heater. After fitting the boilers of the s.s. *Zeno*, in 1894, with this heater, the fire-grates were permanently shortened 12 in., and as the result of prolonged and careful observation it was found that there was a saving of 12 per cent. of fuel and an increase of 10.58 per cent. in the speed of the ship. The owners of the s.s. *Zeno* have since fitted the heater into two other of their steamers. We may further mention that, as the result of exhaustive trials of the apparatus in the boilers of the s.s. *Rocheport*, Mr. Thos. Jack, of Larne Harbour, has had three of his steamers fitted with this heater.

### PATENT MARINE SALVAGE APPLIANCES.

THE wreck-raising appliances, which we have pleasure in herewith illustrating, possess more than ordinary interest in that they are the inventions of gentlemen practically acquainted with the nature and requirements of the service they are designed for, and further, from the fact that they have been tested on a sufficiently large scale to justify the expression of an opinion that they will unfailingly perform the duty required of them.

That the recovery of treasure from the deep has

ever been a fascinating theme is manifest from the large number of patents that have been applied for in connection therewith, but unfortunately few, indeed very few, of these so-called inventions have been the production of men competent to fully realise the meaning of the enormous weights, stresses, pressures, and other difficulties that have in any enterprise of this nature always to be contended with.

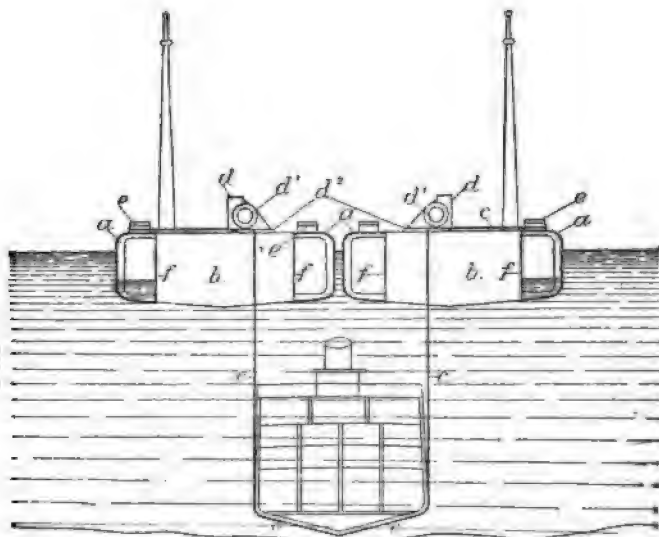


FIG. 1.

The appliances now under notice consist essentially of two parts, namely, the patent camel, or pontoon, and the patent crane, or winch, and these are the joint inventions of Mr. James Bell, Master Mariner, Mr. W. C. Melville, M.I.M.E., Supt. Engineer, and Mr. J. W. Foster, Salvage Agent, the various patents being the property of the Salvage Patent Appliances Syndicate, of 44, Chapel Street, Liverpool.

A cursory examination of the illustrations will suffice to show that these appliances possess, in a

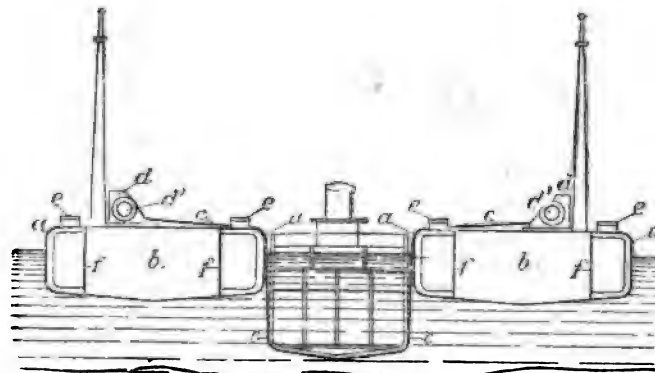


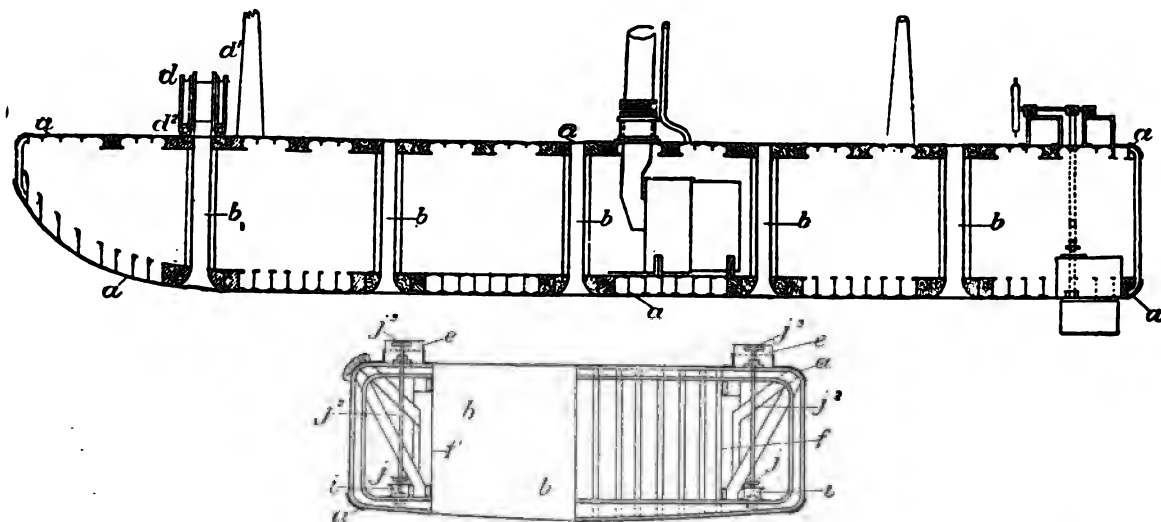
FIG. 2.

marked degree, the following essential qualifications for successfully overcoming the work they are designed for, viz.: Strength with simplicity of construction. Structural adaptability for withstanding all possible stresses and strains. Capability to take up and maintain the most effective position over the weight to be raised. Provision for always ensuring and sustaining



the best possible direction of lift (*i.e.*, the vertical). Ample appliances for lifting at any number of given points, simultaneously or independently, so distributing the strains and lifting efforts over the largest areas of wreck and camels, and minimising the risks in the event of one or more of the lifting tackles giving way. Maximum lifting power with the minimum

3 and 4 being respectively longitudinal and cross sections of one of the camels. Each of these, of the type shown, is divided into six main compartments by the wells *b*, and transverse bulkheads *h*, running from the ends of the wells to the vessel's sides, and into 12 wing compartments by means of the longitudinal bulkheads *f*.



FIGS. 3 AND 4.

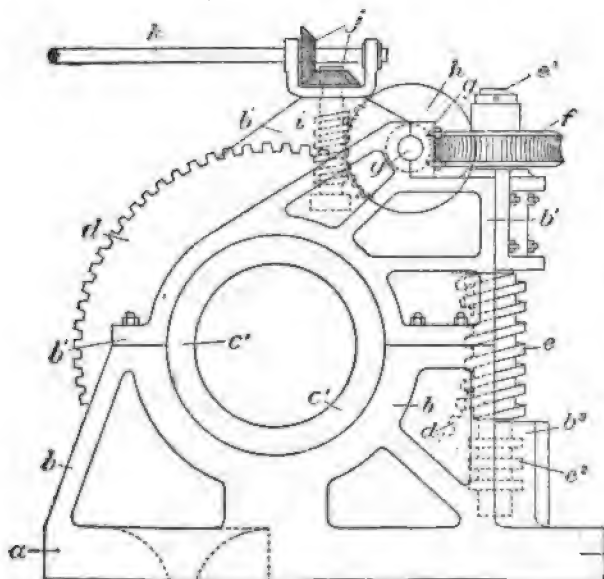


FIG. 5.

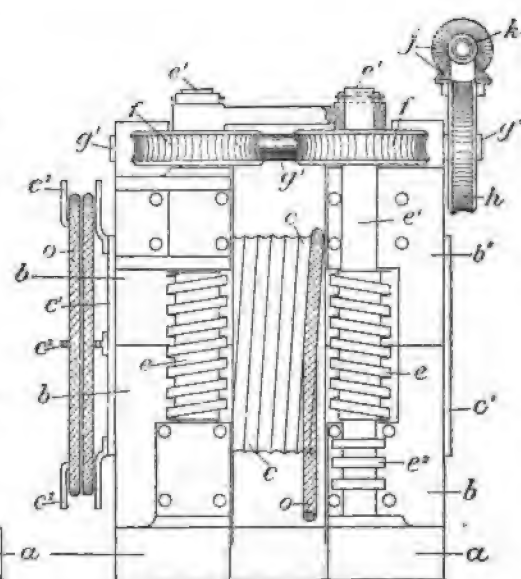


FIG. 6.

of strains on wreck and tackle, and finally, least amount of injury to tackle employed.

Turning now to the illustrations, and considering first the camel, it is, *en passant*, obvious that such an appliance may be used either in conjunction with, or independently of the power of the tide. A cross section showing a vessel slung ready for lifting, with wire ropes leading through wells in the camels, is given in Fig. 1, while Fig. 2 is a section showing a vessel being lifted with wire ropes over the sides of camels, Figs.

The winches *d* (fully described hereafter), have their winding barrels, *d* 1, directly over the wells *b*, and are capable with their bed plates *d* 2, of athwartship adjustment. When the ropes *c* do not pass directly through the centre of the wells *b* (as in Fig. 1), the compartments on the side remote from the strain are balanced with water to ensure an even keel, and similarly when lifting a ship, not deeply submerged, the camels are ranged as in Fig. 2, the winches being placed on the off side and, if necessary, water pumped into the

outside compartments to counterbalance the weight bearing upon the near side.

When a ship is to be raised by the tide, two ropes *c* pass, side by side, through each well *b*, and have each

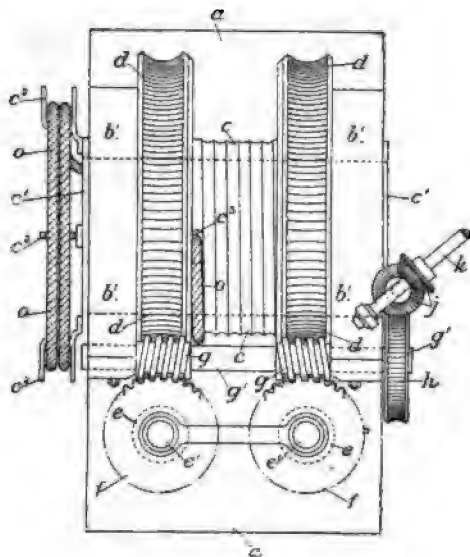


FIG. 7.

one end passed over one of the winch barrels, and the other end passed under the wreck and up through a hole in the bed-plate of the winch on the opposite pontoon, whence it is led and fastened to one of the

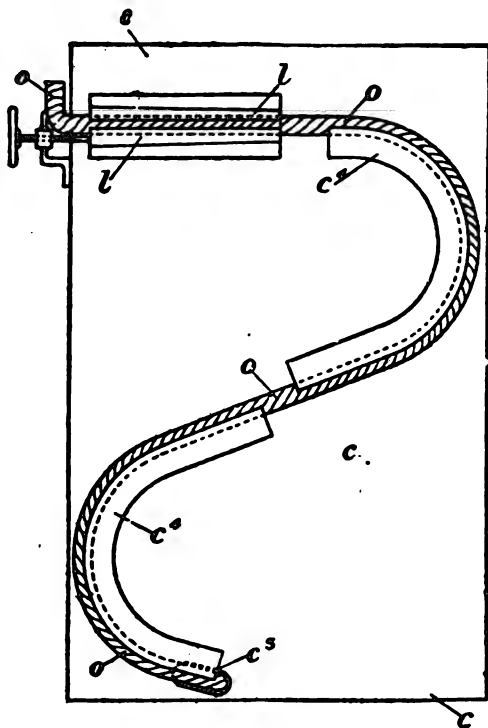


FIG. 8.

bollards *e*, and wrecks twice the weight can be raised under these conditions, compared with those capable of being raised by the winches alone.

Of the main compartments, the four centre ones are

used for engines, boilers, pumps, etc., the bow and stern compartments only being used for trimming the vessel. These and the side compartments are filled and emptied as required by suitable pumps, and hollow box kelsons *i* (Fig. 4), with valves *j*, in the kelson in each compartment, the valves being actuated by rods *j* 2, and wheels *j* 3, placed within the hollow bollards *e*.

To raise a ship of 2,000 tons deadweight in water, without the aid of the tide, four of the pontoons

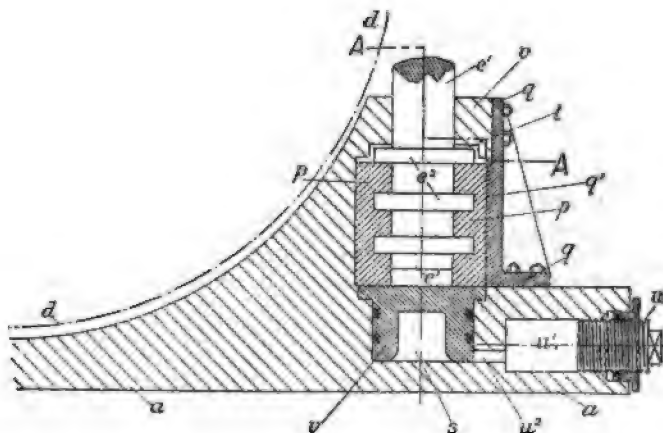


FIG. 9.

shown, each mounting five winches, would be used, and more or less in proportion.

The details of the winch are shown in the following figures, Fig. 5 being a side elevation, 6 an end view, and 7 a plan; while Fig. 8 shows a projection in one plane of the interior of the drum, and Figs. 9 and 10 sectional elevation and plan of a hydraulic thrust-bearing.

As will be seen, the winch is specially designed for

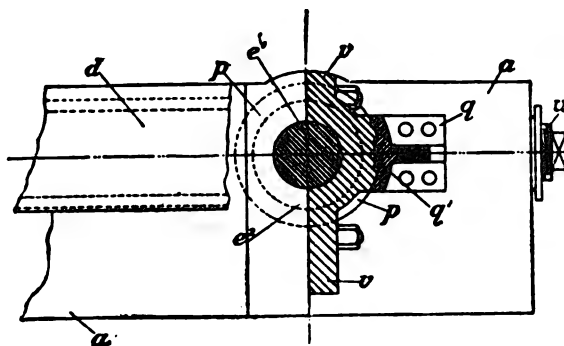


FIG. 10.

raising very heavy weights by means of wire ropes of large size, and in such a manner as to prevent any superimposition of one coil on another, thus precluding any injury to the rope due to the enormous pressure that would ensue were the coils allowed to overlap. The construction is such, that only a certain length of the rope used is carried on the winding drum, the slack end being taken up by a reel (revolving at the same rate), and to which it passes direct from the drum; to ensure this the base plate *a* carries two lower frames *b*, and two upper frames *b* 1. These support the ends *c* 1 of the hollow drum *c*, on one end of which

is the reel *c* 2, for carrying the slack end of the rope. The worm wheels *d*, Fig. 5, fixed on the drum, engage the worms *e*, which are worked by worm wheels *f*, keyed on the shafts *e* 1, and driven by worms mounted on the shaft *g* 1. The shaft *g* 1 is in turn rotated by a worm wheel *h*, driven by a worm *i*, supported in one of the flanges *b* 1, and moved by the bevel wheels *j*, from the shaft *k*, connected to any suitable source of power.

When commencing to lift, very little, if any, of the rope would be on the drum, while the part connected to the wreck would be taut, the remainder being on the reel *c* 2, to which it passes from the drum by way of a gradually curved hole *c* 3, Fig. 8, and over two grooved internal guides *c* 4, of suitable curvature, thus when tension comes upon the rope friction is created, and the hold increased. The actual making fast of the rope is, however, accomplished by a gripping device *l*, placed between the guide *c* and the reel *c* 2. The "lead" of the rope being nowhere turned or bent at a sharp angle, it cannot suffer any damage by the gripping in the drum.

In the smaller winches, the main driving worms *e*, have their shafts *e* 1, mounted vertically, the thrust being taken by rings *e* 2, fitting in corresponding thrust-block grooves formed in the pedestal *d* 3, but in cases where very heavy masses have to be dealt with the shafts *e* may be supported hydraulically, as shown in Figs. 9 and 10, and the pressure on them indicated. In this construction the collars, *e* 2, work in, and are carried by a two-part block *p*, prevented from rotating by a key *g* 1 on the retaining bracket *g*. The lower end of the shaft *e* 1, and block *p*, rest upon a piston *v*, working in a cylinder *s*. The top cap *v* limits the rise of the shaft to the space *t*. The shaft *e* 1, is raised or lowered by the screw plug *u*, moving in the cylinder *u* 2, connected to the cylinder *s* by the passage *u* 2, the spaces being filled with oil. The pressure on the shaft, proportional to that on the lifting ropes, is indicated by a suitable pressure gauge connected to either of the cylinders, and marked to show the weight in tons carried by the winch. Each winch is also provided with a revolution counter, and the indications of these and the gauges are electrically reproduced by suitable instruments in the bridge-house, thus enabling the salvage agent in charge to have complete control of the whole of the lifting power at his command.

## THE YACHTING EXHIBITION.

THE fourth annual Yachting Exhibition, which opened at the Royal Aquarium, Westminster, on January 15th, and will close on March 4th, must certainly be looked upon as a decided advance upon its predecessors both as regards the number, quality, and variety of the exhibits, and though it cannot, of course, in any way compare in magnitude with the great International Exhibitions, it reflects great credit on the executive for having got together so much that is interesting in so little space, and without having to call on the visitor for any charge other than the ordinary admission to the Aquarium.

Among the firms whose exhibits most interested us we noticed the following:—

Simpson, Strickland & Co., Limited, of Dartmouth, who are showing a 33 ft. mahogany carvel-built launch, fitted with Kingston compound surface-condensing engines (cylinders 3 in. by 6 in. by 4 in. stroke) and Thornycroft water-tube boiler of the newest type, having water-tube bars and working at 180 lbs. pressure. This firm also show a model of Shepherd's patent

double and single action capstan, an ingenious piece of mechanism, which we hope to fully describe in a future issue.

The Daimler Motor Syndicate, Limited, of 95, Billiter Buildings, London, E.C., show the Daimler motor launch *Mercury*. This launch, the property of the Hon. Evelyn H. Ellis, is 35 ft. long, and is driven by a 5 H.P. four-cylinder motor. She has been in use four years and certainly looks little, if any, the worse for wear. On the same stand we also noticed 1 H.P. and 4 H.P. marine type motors, and a "horseless" carriage, phaeton type, propelled by a 3½ H.P. motor, capable of carrying fuel for a 200-mile run.

Messrs. Edwin Clark & Co., the Canal Iron Works, Brinscombe, Glos., are exhibiting two sets of highly-finished small size compound-engines, suitable for launches, and in addition to half models and photos of craft built by them, we noticed examples of steering gear for yachts, &c.

The Defiance Anchor & Cable Co., of 95, Hatton Garden, London, E.C., have on their stand a fine example of the "Honess" self-canting anchor. This anchor can be used with or without a stock, and the example shown, weighing 3½ tons, is of Bessemer steel.

Messrs. Fredk. Braby & Co., Fitzroy Works, Euston Road, London, N.W., are the manufacturers and exhibitors of General Crease's patent enamelled iron cisterns and tanks. These are thoroughly enamelled on the inside and therefore cannot rust. Water stored in them maintains its purity and clear appearance over a considerable length of time, and after three years' testing in the Royal Navy they have been officially and most favourably reported on.

The Liquid Fuel Engineering Co., of 20, Abchurch Lane, London, E.C., and East Cowes, Isle of Wight, for the present occupy their space with a splendidly finished pair of 10-horse compound engines, which with pumps weigh only 185 lbs. They have reserved space for a 25 ft. mahogany carvel built launch, fitted with compound engines of 25 H.P., steam being supplied by a water-tube boiler, fitted with patent liquid fuel burner. This craft steams at 10 knots per hour, and weighs complete only 23 cwt. The company also have space for an 18 ft. cedar carvel built launch, provided with tandem compound engines of 5 H.P., the type of boiler and burner being as before. This smaller vessel steams 7 knots, and weighs complete less than 8½ cwt. With these boilers and burners 100 lbs. of steam can be raised in less than 20 minutes, with an entire absence of smoke and smell. There is also on this stand a selection of the patent "Simplex" stockless anchor, adapted for yachts, torpedo boats, &c. These anchors are made of annealed steel, moulded by a patent process, and consist of two pieces only, there being no rivets, screws, or other fastenings.

Messrs. W. S. Sargeant & Co., of Fishbourne, Isle of Wight, have a full-size electric auxiliary screw sailing boat, fitted with Eystein accumulator cells, on view, also models of electric motors, electric launches, and fittings. This firm built the first large electric launch, *Viscountess Bury*, a description of which appeared in our volume for 1887.

Messrs. New & Mayne, of Palace Chambers, Westminster, S.W., are exhibiting, working in a tank, the electric rudder motor, which we illustrated and described in our last October issue, *vide* page 266. We also noticed this motor on a boat built by Messrs. Messum & Son, of Richmond.

The Keybar Engineering Co., Limited, of Hampton Wick, exhibit a very well designed and completely fitted set of two cylinder compound engines, suitable for a large launch or small size yacht, and also a much smaller set of similar machinery, both sets being fitted with the ordinary link motion.

Messrs. Cochran & Co., of Duke Street, Birkenhead, have on their stand a very nicely finished half model of the steam yacht *Saxon*, accompanied by large scale drawings, showing the internal arrangements, fittings, &c. They also contribute photographs and models of other yachts and launches built by them, and models and photographs of Cochran's patent boiler are also to be found on this stand, all of which testify to excellence of design, workmanship, and material.

The British Aluminium Co., of 9, Victoria Street, London, S.W., show a full-size launch built entirely of "the lightest of metals," and having an oil motor engine. The appearance of the naked metal struck us as being more startling than pleasing.

Capt. R. G. Lacey, of 75, Summerley Street, Earlsfield, London, S.W., has on his stand various samples of his well-known sea anchors and oil distributors, as now fitted on the

Castle (Donald Currie) Line, the General Steam Navigation Co., the Inman, the Post Office Telegraph Ships, &c. He also shows his improved line-throwing apparatus, by means of which 200 to 250 yards of line may be thrown by a small rocket, fired from an adjustable socket, instantly clipped on any part of the ship's rail, either from ship to ship or ship to shore. All the Ostend Mail Boats of the Belgian Marine Administration are now supplied with these appliances. Lacey's drift buoy and line for sending lines ashore, or from ship to ship, is also shown, and consists of a lead so shaped as to present a ship-like form, two of the corners being hinged may be folded back to form the bows. This with the buoy forms a miniature craft, and is provided with a self-setting sail, by which it may be drifted and carry the line to positions beyond the range of the rocket.

Mr. E. C. Davis, of Stroud, Glos., is the exhibitor of a very distinct system of black and white signalling, the signs whereof are identical in day or night time, thus overcoming the disadvantages of colour blindness, dirty flags, &c. From what we could see of them in the space at our command, these signals were certainly readable with greater distinctness and at a greater distance than were coloured signals of equal size, while they can be exposed in all weathers and so as to be visible from any desired point, whether the wind be blowing or not.

The Audible Indicator Syndicate, of 141, Fenchurch Street, London, E.C., exhibit the ingenious device for audibly indicating to the navigating officer whether his orders to the engine-room have been rightly executed, which we illustrated and described in our issue for September last, page 222.

Messrs. Cox & King, of 5, Suffolk Street, Pall Mall, London, S.W., are the exhibitors of some half-dozen half models of yachts designed by them. The largest of their exhibits, and it is not surpassed, if equalled, by anything in the exhibition, is a beautifully executed half model, accompanied by set of drawings of a high speed twin-screw ocean-going steam yacht designed by them, and now building for an American owner. This vessel, which is to be 255 ft. long, with a beam of 32 ft. 6 in., will be provided with two completely independent sets of triple-expansion machinery, designed to propel her at not less than 18 knots per hour.

Messrs. Glaser, Bowers & Co., of 8, George Street, Minorities, London, E.C., exhibit numerous examples of their patent reindeer-hair life-saving appliances in the form of life-buoys, mattresses, jackets, boat-seats, &c. The various articles are filled with the hair of the reindeer, which, weight for weight, has three times the buoyancy of cork, and, unlike the latter, does not deteriorate or lose its floating properties however often, or long, it is kept wet. For pillows, mattresses, and seats it is very soft and smooth, replacing the hard, lumpy cork to great advantage. The firm have fitted out the *Tartar Prince*, of the Prince Line, and several yachts with these goods, which, in the form of a pillow life-belt, are certified and approved by the Board of Trade.

## POWDERED COAL AS A FUEL.

WE have lately had an opportunity of seeing the "Wegener" system of obtaining heat by the combustion of powdered coal, which has been introduced into this country by Messrs. Bryan, Donkin & Co., Limited, of Bermondsey, London.

The theory of reducing coal to the smallest possible size before burning is beyond doubt perfectly sound for the reason that the largest possible surface relative to volume should be exposed to enable the oxygen to combine with the coal with the greatest facility, so that the resultant product from carbon and oxygen is  $\text{CO}_2$ . This is broadly what the "Wegener" system has been devised to effect, and which, we understand, has been fulfilled; but besides this, other matters must be carefully considered before a definite opinion can be formed as to its practicability for ordinary commercial purposes. We will first describe the system and apparatus employed therein before dealing with these considerations. Ordinary dust coal, or the smallest coal procurable, is purchased and is pulverised in some manner. At Messrs. Bryan, Donkin's works this was effected by means of a "Devil" disintegrator, which delivered the powdered coal into sacks. These small sacks of powdered coal, weighing about half a cwt. are put into a conical hopper. The powdered coal gradually falls out of the sacks, as required into the hopper, and then on to a sieve about  $\frac{5}{8}$  in. diameter, with small openings in it. The powdered coal would

not go through this sieve with certainty without continual tapping, and this is done in the following way:—

Immediately beneath the hopper, and taken down to within a short distance of the boiler-house floor, is an air-pipe, about 20 in. diameter, through which nearly all the air for combustion enters. As it enters it is made to pass through the blades of an air-wheel or turbine, and this passage of the air causes the latter to revolve like a smoke-jack. On the axis of this air-wheel there is a little knocker which taps the sieve about 150 to 250 times a minute, causing the powdered coal to descend vertically through the sieve, meeting the air for combustion as it ascends vertically. The powdered coal and air for proper combustion in this way get mixed thoroughly together and pass on into the boiler flue, each particle of coal being surrounded by air. There is no grate and there are no fire-doors, and the stoking simply consists of putting a sack of powdered coal from time to time into the top of the hopper and seeing that the right amount of air is going in for combustion. If there is not sufficient air for proper combustion entering through the main opening, as seen by a little smoke emitted from the chimney there are two other smaller pipes where additional air can be admitted, each kind of coal requiring a somewhat different amount of air. The only object of the air-wheel revolving, from 50 to 80 revolutions per minute, is to shake the sieve and cause the powdered fuel to go into the furnace in the quantity desired. When more steam and coal are required a greater knook is given to the sieve and more powdered coal is burnt; when less is required a less shake is necessary. A screw adjustment for knocking is provided, to regulate the amount of coal entering, which is done by turning with two fingers a  $\frac{1}{4}$  in. thumb screw. The only duty of the attendant is to put the sacks of coal into the hopper, and he ascends a short ladder to do this. He also has to regulate the amount of air for combustion, so that there is no smoke. He can therefore attend to several boilers, as the amount of work per boiler is so small.

We understand that an analysis of the gases of combustion proves that the combustion is excellent and the amount of  $\text{CO}_2$  is much higher than with ordinary furnaces. The apparatus was fitted to a Lancashire boiler at the Bermondsey works, the fire-door, grate-bars, &c., having been removed. The furnace was lined for several feet of its length at the front end in order to obtain a retort action. A hanging bridge was arranged, a short distance along the furnace tube, and at a further distance back an ordinary bridge.

The source of energy for working the apparatus is the draught of air in the chimney, the air turbines being operated by the draught alone. Many years ago Mr. Crompton used powdered coal, but this was with a fan, driven by external means and not with the ordinary chimney draught. The "Wegener" system is the first system that has been devised, to our knowledge, in which the apparatus and its function are what we may term self-contained. We understand that a vacuum of from 2 to 3 millimetres of water at the base of the chimney is sufficient to start the apparatus in a cold boiler, a small fire of wood being lighted on the bottom of the furnace tube to ignite the powdered fuel. When running at full power a vacuum of about 9 millimetres at the base of the chimney is required.

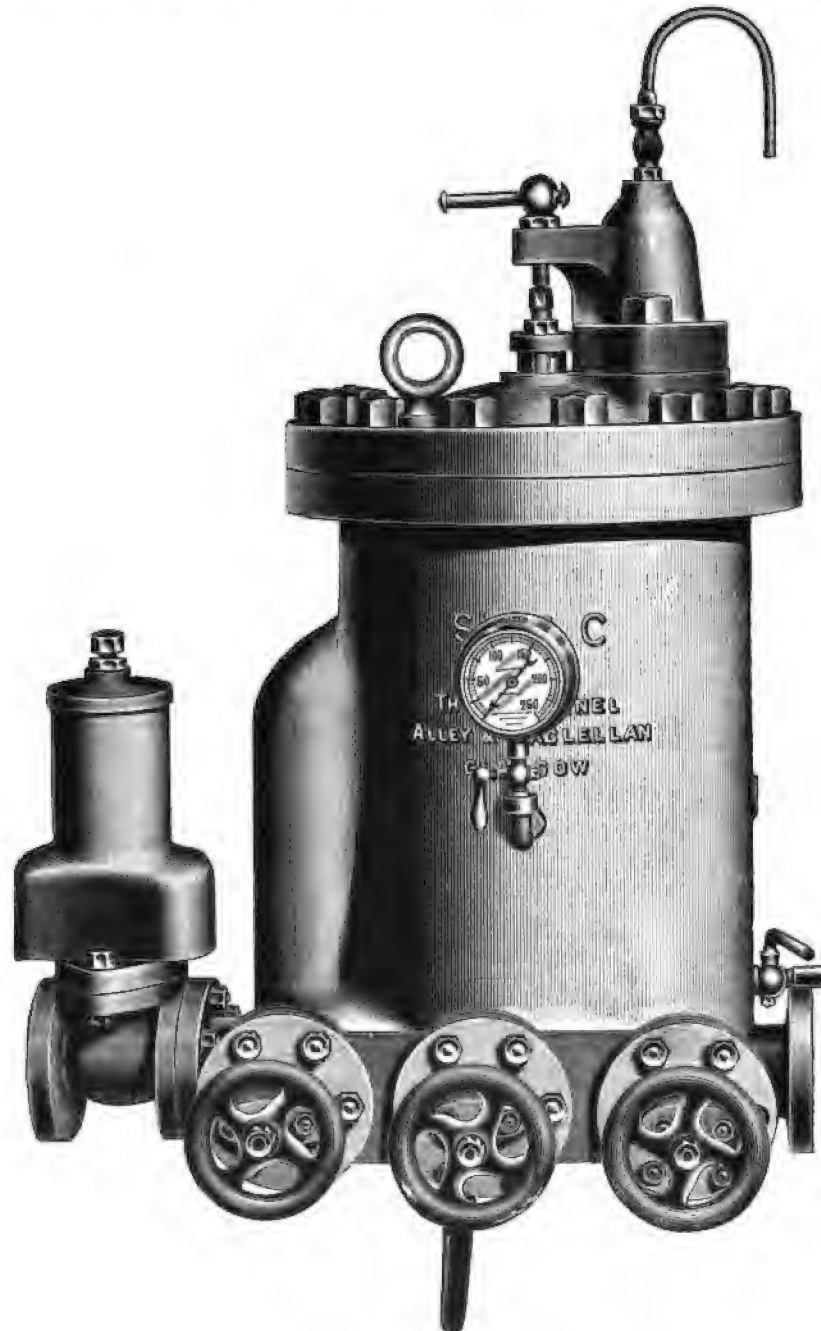
The grinding of the coal into fine powder increases the first cost of coal about 10 per cent. As to the economy with this system over ordinary hand-firing, this we understand varies with the different circumstances, kind of boiler, fuel, and rate of combustion; but it is generally from 20 per cent. to 30 per cent. This is due to a better combustion, or a higher percentage of  $\text{CO}_2$ ; further, no cold air enters which is not wanted, there being no fire-door to open, and each particle of coal is surrounded with air, giving excellent conditions for chemical combustion, and evolving no smoke.

One point that struck us very forcibly at the trial was the horribly dirty condition that the stokers got into in the carrying out of their duties, and it would certainly appear to us that if this system is to be applied in an extended manner, that automatic means must be provided to convey the powdered coal between the grinder and the furnace, and thus obviate the necessity of handling it by human agency.

Another point that deserves attention is the travel and final disposal of the non-combustible constituents of the coal, viz., the ash, which in the best of coals is not much less than 5 or 6 per cent. Now, with too little draught it would appear that the ash dust would be deposited in the flues of the boilers, which would be eventually choked, while, with too strong a draught,

the dust would be carried up the chimney and distributed into the atmosphere, through which it would eventually settle. It is obvious that this would not be permitted in a neighbourhood where property of any value was adjacent to the chimney, as the dust that should be carted away in the dust cart would be deposited

great advantage to battleships, cruisers, and torpedo craft. Of course if space were no object, the dust could be deposited in settling chambers by robbing the dust of its momentum and allowing it to settle by gravitation, but it would seem that the chambers would require to be of considerable size; this would



THE PATENT "SENTINEL" MULTIPLE FEED-WATER FILTER AND OIL SEPARATOR. FIG. 1.

upon the roofs and in the gutters of buildings, besides covering the adjacent ground.

Coming now to this application of this system to boilers on board ships, many of the objections before mentioned do not hold good, as the draught required is easily attainable, and the distribution of dust-ash in the atmosphere is of little or no importance as means could be adopted to deliver the ash on the lee side of the ship, or even close down to the surface of the water. The fact of combustion being carried on with no smoke would be of

be practical in some cases on land, but on a ship, of course it would be out of the question.

It would appear that it is necessary to grind the fuel just before use in order to get its full calorific value, so that each ship would require a disintegrating plant, but on the other hand, the bunkers would hold a greater quantity of fuel by reason of its small size which can be burnt with greater economy than ordinary coal can, and further, that when found desirable, forced or induced draught can be adopted instead of ordinary chimney draught.



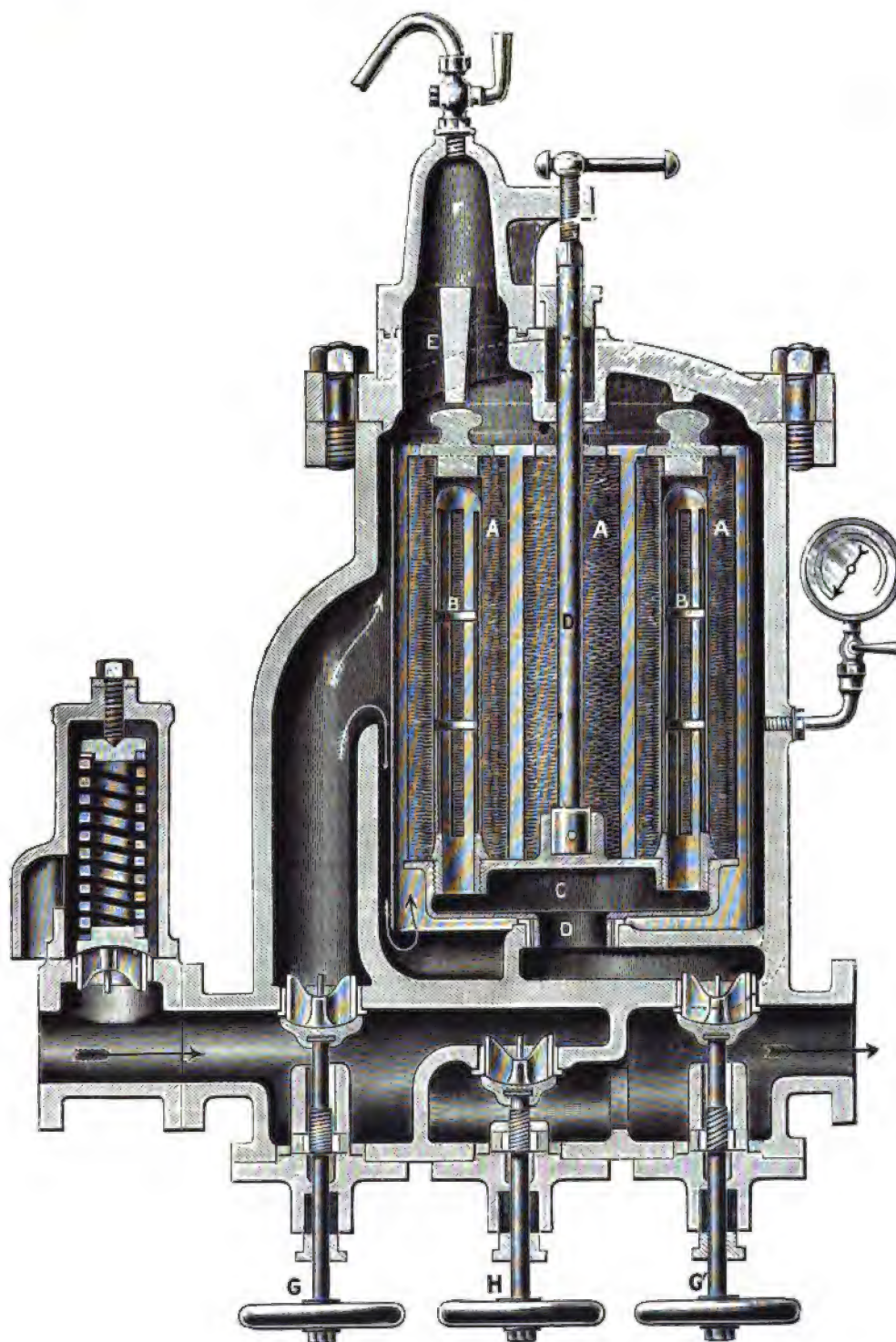


FIG. 2.

There are many other matters upon which one would require to be satisfied by the results of trials over some time before coming to a decided opinion on the merits of powdered fuel; at the same time it must be admitted it is a step in the right direction, as any system or apparatus that will increase the efficiency of fuel as a heating agent deserves the attention of engineers, as it tends to reduce the enormous waste of useful potential energy that is going on around us every day.

#### THE PATENT "SENTINEL" MULTIPLE FEED-WATER FILTER AND OIL SEPARATOR.

WE have pleasure in herewith illustrating the Patent "Sentinel" Multiple Filter and Oil Separator, manufactured by Messrs. Alley & Mac-

lellan, of the Sentinel Works, Glasgow, and approved by the Board of Trade, Lloyd's Register, Bureau Veritas, &c.

In addition to offering a very large and durable filtering area, the construction of this filter is such as to ensure the utmost efficiency combined with simplicity and fewness of parts, while the rapidity and ease with which the filtering medium may be renewed is not surpassed in any other filter we are acquainted with.

As will be seen from the illustrations, of which Fig. 1 is an external elevation, Fig. 2 a sectional elevation, and Fig. 3 a view showing the filtering frame and mantles detached, the filtering medium takes the form of six tubular mantles, AA in the section, plugged at their upper ends and enveloping the perforated brass tubes BB, these latter being screwed at their lower ends into the flat drum-like brass casing C. This casing C is free to rotate on a central "spigot" D,

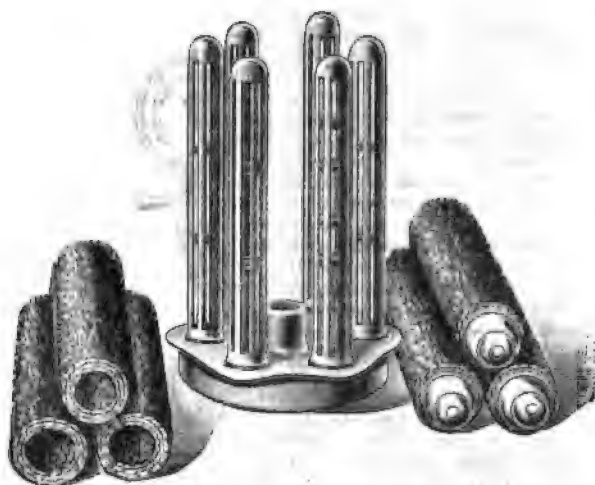


FIG. 3.

motion being imparted to it by the central shaft D, passing through a stuffing-box in the cover and squared at its upper end to take an ordinary spanner.

The passage of the feed-water through the filter is controlled by the valves G and G', the closing of these and opening of the valve H providing a bye-pass direct to the boiler.

Assuming the filter is in action, the water entering by the valve G follows the direction indicated by the arrows, and passing through the filtering mantles AA, and perforated tubes BB, falls in its purified state into the drum C, whence it passes by the spigot D and valve G to the boiler, and the oil, being light, ascends into the oil dome F, from which it can be blown by opening the cock I, while the heavy deposits and dirt fall to the bottom and are discharged from a drain cock (not shown in the drawing), placed on the bottom of the filter. A steam cock admits of high pressure steam being introduced inside the drum, or casing C, for the purpose of blowing off any portion of the oil adhering to the mantles, and this, ascending to the oil dome, can then be discharged through the cock I. This steam cock should of course only be opened when the filter is shut off from the feed.

To replace the filtering mantles it is only necessary

to remove the two bolts holding down the oil dome F, which on being lifted off leaves the opening E clear. A movement of the shaft D1 brings each of the perforated tubes B under the opening in turn, when the removal and renewal of the mantles is but a moment's work, an advantage which cannot be over-estimated in hot climates or rough weather.

The makers have found, as the result of carefully carried out tests, that the filtering surface through which the feedwater has to pass, should have an area equal to not less than 250 times the area of the feed-water pipe, and by giving these ample proportions they have succeeded in constructing a filter which combines the maximum of efficiency with the minimum of charges for maintenance. The large filtering area, by precluding any liability to clogging, also prevents back pressure on the pumps, and so does away with that frequent source of failure, rupture of the filtering medium through excess of pressure.

These filters are fitted on several ships and are giving every satisfaction.

### THE PASSENGER AND CARGO STEAMER "TELAE."

MESSERS. JOSEPH L. THOMPSON & SONS, LTD., North Sands Shipbuilding Yard, have just delivered the finely-modelled passenger and cargo steamer *Telae*, built to the order of the Mersey Steamship Co., Limited, managed by Messrs. Leech, Harrison, & Forward, of Liverpool. The vessel is intended to run in their passenger trade between London, Madeira, and the Canary Islands. The length, b.p., is 242 ft. breadth; extreme, 34 ft.; and depth, moulded, 19 ft. 6 in. She has been built under Lloyd's special survey for their highest class on the flush deck rules, with a long full poop and bridge combined and topgallant forecastle. Her deadweight carrying capacity is over 1,600 tons. The lines of the vessel are very fine, and with her fore-and-aft rig give her a very smart appearance. Sleeping accommodation for 30 first-class passengers has been provided in the poop amidships, in large, airy state-rooms, two persons being in each room. The dining saloon is placed above the berths on the poop deck, forward of the engine and boiler casings, and is arranged to seat the whole of the passengers at one time. Above this saloon house is placed the chart and wheel house, which is built of teak, the chart house having sleeping accommodation for the captain. On the poop deck aft is placed the accommodation for the officers, engineers, stewards, mess-rooms, &c. In the forward part of this house is arranged the smoke-room for the first-class passengers, being a very handsome apartment, sumptuously upholstered and fitted with the necessary tables and all the accessories for a first-class passenger vessel. The crew and firemen are berthed in the topgallant forecastle. The woodwork and panelling in the saloon are architecturally designed, the panelling and carved work being of hardwoods suitably matched, and relieved, in addition, with inlaid wood of different colours, which gives the apartment a very handsome appearance. The tables and chairs are constructed of hardwood, and match the design of the saloon, the chairs being fitted with elliptical motion. The saloon is brilliantly lighted with large plate-glass windows, cut with a floral design. Adjoining the saloon is the entrance hall, worked in a design to match the main apartment, and closely adjoining this is the large pantry with all the requirements for the number of passengers. All the passageways throughout the accommodation, lavatories, &c., are fitted in polished hardwoods. Special attention has been paid to the sanitary arrangements of the vessel, the baths being of Stourbridge ware, and all the other sanitary appliances are of an equally modern type. The upholstering of the sleeping accommodation has also received careful attention, the materials being of a high-class quality and beautifully finished. Each of the bed berths has a metallic mattress, and the sofa and berth bottoms are also fitted with springs. Each passenger's room has a patent china lavatory basin, plate-glass mirror, corner racks

and all the upholstering usual in a first-class vessel. The hardware work throughout is of a special quality, the whole of the fittings connected with the first-class accommodation being plated, and the hardwood fittings polished. The saloon doors have patent springs, and every attention has been given to the comfort and convenience of the passengers, officers, and crew. The vessel is fitted with the usual number of watertight bulkheads, and also a number of wood division bulkheads for the proper division of the cargo. Water ballast is carried in a cellular double bottom throughout. The main deck is laid with chequered iron where exposed, and sheathed with yellow pine over the remainder. A lower deck is laid in the forward hold.

The long poop and fore-castle decks are of yellow pine with teak margin planks. There is a steam windlass on the fore-castle head, and patent stockless anchors are supplied. There are three steam winches at the hatches with the usual derricks, &c., for the rapid handling of cargo. The steam steering gear is fitted in a house at the after-end of the casings, and a screw gear at the after-end of the vessel. A large fresh-water condenser is fitted amidships and connected to the various fresh-water tanks, &c. Sanitary tanks and a special sanitary pump are also arranged in connection with the first-class accommodation. The vessel is heated throughout by an elaborate system of steam heaters and pipes, whilst the whole of the ventilation is carried out by a system of shafting and centrifugal fans. There are four large boats to meet the Board of Trade requirements, and the whole of the vessel has passed the Board of Trade for their passenger certificate. The galley has a large cooking range, baker's oven, steam hot-water boiler, and a steam press, in addition to all the usual appliances. The galley, bathrooms, w.c.'s, &c., are all suitably laid out with tile work. A complete system of electric bells is fitted throughout the accommodation, and the whole of the vessel is brilliantly lighted by a complete electric light installation, the fittings of which in the passenger accommodation are of a special design and electro-plated. The exhaust pipes from the winches, windlass, &c., are led back to an exhaust tank in the boiler-room. The donkey boiler is of the horizontal multitubular type, and stands forward of the boiler-room in the hold. Awnings are rigged over the whole of the accommodation. The fitting of the sidelights has received careful attention; all of them are of brass, most of them of large size, and many of them of a special design. The engines have been built and fitted by Messrs. John Dickinson & Sons, Limited, Sunderland, and are of triple-expansion type, having cylinders 19½ in., 82½ in., and 54 in., by 39 in. stroke, being supplied with steam by one large multitubular boiler, working at 180 lbs. pressure. The boiler is fitted with Morrison's patent furnaces, Serre tubes, and Howden's system of forced draught, and with Hackworth's valve gear, Dickinson's patent crank shaft, Gwynn's centrifugal circulating pump, Edmiston's feed filter, McColl's stern tube, bronze propeller, and special auxiliary pumping-machinery. The whole of the engine and boiler-room fittings and equipment are of the most modern description, and embrace all the latest improvements. The machinery has been built under the survey of the Board of Trade for their passenger certificate. The specification was most complete in every respect. The running of the machinery has given general satisfaction to the owners, and this is one of the most complete sets of machinery fitted by this well-known firm. The hull and machinery have been built under the personal superintendence of Messrs. William Esplen & Son, of Liverpool, on behalf of the owners, and the rapidity with which the work has been turned out, and the high-class character of the design and workmanship reflect great credit on the builders, who have recently been paying special attention to passenger vessel work.

**The First Lord of the Admiralty and Engineers.**—Without in any way wishing to detract from the excellence of the executive officers of the Navy we cannot but express our surprise and feeling of pain at the very marked manner in which mention of the engineering officers of the Navy was avoided throughout the speech delivered by Mr. Goschen, at East Grinstead, on January 21st. Surely now that steam is the sole propelling power in all our ships of war the men who create, guide, and guard this power are in every way worthy of a better recognition than the present First Lord seems inclined to give them, and though we may pass over the (let us hope unintentional) slight we cannot in this age of science regard it as good policy to so very completely ignore the engineers.

## THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

### The Isle of Man Steam Packet Company.

THERE are three matters which especially render the Isle of Man line noteworthy. The first is its age. For it started its service in the reign of our lamented sovereign George the Fourth. This puts it in the class with the General Steam Navigation and the City of Dublin Steam Packet Companies, and makes it far senior to any ocean line in existence now, or at any time. The second point to be noticed is the fact that its boats and their crews always have the Sunday holiday. The deed of association, which was executed in the year 1828, stipulated that the company's vessels "should not ply on the Sabbath," and this rule has been adhered to with great fidelity. Nowadays, when the service is a daily one—and at times even more frequent—the rule is still observed, and none of the company's vessels put their bows outside harbour on the Sunday, which was designated by the term which would strictly have applied to Saturday.

It is perhaps as well that the line did not read this clause too literally, for the week end is one of their especial harvests. Extra boats go to the Isle of Man as soon as business is closed in summer on the Saturday afternoon, and vessels are ready at Douglas to bring the excursionists back in time for the opening of business on Monday morning. The third peculiarity I would notice in the company is its financial success. This it has achieved in spite of very serious, if not very long continued opposition.

Its fleet began in a very humble way with a steamer of 200 tons, engined by Napier's. She commenced running in 1831, and the following year was joined by two others. These fulfilled the requirements of the traffic for the first decade of the company's existence. The forties saw the size of ship doubled and another trio built.

At the end of the next decade was built a vessel whose name is still represented in the fleet list, and whose fame will be remembered as long as men are interested in the famous dashes of the blockade runners in the American Civil War. It is needless to say that the vessel I refer to was not of very mature age when she was sold for this dangerous and arduous service. Only the pick of the smaller mail boats were any use for the blockade runner, who wanted the greatest speed combined with light draught, and did not mind what price he paid the owner if he could suit his requirements without delay.

In 1860 they acquired a vessel, the *Mona*, which, at that time, was a very crack paddle vessel, but which, to-day, is working in their service as a twin-screw under the name of *Ellan Vannin*. Their next acquisition was one of the ships which inaugurated the Queenborough and Flushing service in 1875, when the Isle of Man Line was able to do without her. By the time this ship was built, the size had increased threefold upon that of the original steamer of the fleet. The length had got up to nearly 280 ft. and the speed was over twelve knots. When my acquaintance with the Isle of Man commenced the steamers ran but thrice a week in the winter, and the knowledge of what passed in England was very limited. There was no railway, and a more out of the way spot would have been difficult to find. The seventies saw an increase in the speed of the steamers to fourteen or fifteen knots and in 1888 Caird's built the *Mona's Isle*, whose rate was fully eighteen knots. At this time the company was paying a dividend of 17 per cent., and it was hardly likely that it would be suffered to continue its monopoly, well as it served the public. Two oppositions were started to it from Liverpool. The first owned a pretty little vessel called the *Lancashire Witch*, but this was not a serious opponent, and the *Lancashire Witch* soon changed her name—as indeed most Lancashire witches get plenty of chances of doing. The other was a much stouter thorn in the old company's side. Two steamers had been built at the Fairfield Yard to break the Isle of Man record, and like all Fairfield boats, they did all that was expected of them. They did more. For these two boats not only maintained a sea-speed of 20 knots, but they stood a terrible lot of hard work. The contest caused the service to become not merely a daily but a twice-a-day service, by each company, and that at reduced fares. Each of this pair of sisters did the double journey of about 70 miles each week-day. The one that left Liverpool at 10 a.m. left Douglas at 4 p.m. the same day, what time her sister was leaving the other end of the line. On occasion, when special excursions engaged them, they even squeezed a third crossing

into the twenty-four hours. So keen a fight could not, of course, last, and after a time the old company acquired these two ships, which has since stood it in very good stead. A period of comparative calm had naturally to follow such a time of stress, and the next vessel to join the fleet was the twin-screw *Tynwald*, of a speed of 18 knots. Her tonnage is just under 1,000 gross, which, though five times that of the pioneer, is nearly 700 tons less than the 20-knot paddlers of five years earlier. For some reason which I have not been able to learn, the company is not satisfied with the twin-screw—in which feeling they differ from every other company of which I know anything—and they are now reverting to the paddle in the steamer which is now preparing for their summer work. She will be a paddler and of a speed to eclipse the two 20-knot "Jubilee boats." There has been opposition of recent years, but it has been of a kind which has not yet succeeded in making much running against the line. Besides the ordinary mail service between Douglas and Liverpool, there are steamers run from the Island to Fleetwood and, as occasion offers, to Holyhead, and to Scotch and Irish ports. Ramsay also has its service during the season, and vessels of the fleet make a day's excursion round the Island in the summer. Generally, it will be seen that as long as the old company treats the public as it has treated them in the past, giving them modern boats and great speed, it is not likely to be effectively opposed. It has reduced the time of the 70-mile passage to three hours and ten minutes, and has carried twelve million passengers without the loss of a single life. Such a record speaks for itself.

#### A Big Cargo.

I have from time to time noted some of the large cargoes carried out of the port of New York. This time it is New Orleans that claims our attention. On her first voyage from New Orleans to Liverpool, the new twin-screw liner of the West India and Pacific Company, of which we have already spoken here, broke the record in this direction from the Southern port. The cargo of the *American* on this trip included no less than 15,840 bales of cotton, 131,468 bushels of grain, besides other merchandise. With economical vessels of this capacity to compete against, it is obvious that few of the smaller and older compound boats are worth anything in these trades, and must soon find their way to the shipbreaker and the scrap heap.

#### The Non-technical Press

will always give one something to write about. My attention has been called to the first of a series of articles on merchant skippers and their experiences, which is commencing in the pages of one of the oldest and most widely circulated illustrated sixpenny magazines. My eye was caught by the portrait of a captain of one of the mail liners whom I have reason to know by sight. I read the letterpress and found that an incident in the life of a liner, which he once commanded, was referred to at length. But such a botch of the story was made as prevented any human being making head or tail of it. The fact was the skipper in question was in command of a mail liner bound north. When he was 800 miles on his voyage he fell in with another mail boat bound south and broken down. He turned round and towed her to his own starting place, and then re-commenced his voyage. For this service he obtained for himself, his crew, and his owners, a very handsome salvage award. The writer on this occasion distinguished himself by making out that the saving captain was at the time in command of the ship he actually saved, and that he picked up some third and unnamed vessel. Further on in his article he speaks of the Castle Line and of their steamers. Then he mentions the Union Line. He had found that all Castle boats were the ——— *Castle*, and so he apparently thinks all Union boats plying to the same ports must be ——— *Castles* too. Accordingly he speaks of the *Moor Castle*, and that more than once. This is very funny, no doubt, but we must not ridicule the non-technical press too much. I was reading the next day the columns of one of the "smartest" shipping weeklies—a journal which cannot make mistakes—and I read that there was lying in the Liverpool Docks, a screw paddle steamer. Here, I thought, is the opportunity for Liverpool readers. This is a thing unique. There was once a screw paddle boat, viz., the *Great Eastern*. But she is gone the way of all ships, and the *Prince of Wales* must be quite of a class apart. But on turning her up in the Register I find she is a very ordinary paddle boat belonging to the Great Eastern Railway, and was built at Glasgow eighteen years ago. The "screw" must have been a misprint for "iron."

#### Another old Ship

has been discovered in West Prussia. I imagine she was as near a mail steamer as the Vikings got. I hear of the discovery from a correspondent who has just returned from the north. The vessel was found in a meadow near the coast, which, tradition says, was centuries ago covered by the sea. There being a story that a Viking ship was entombed there, search was made a few weeks ago, and parts of the vessel found. These were fitted together by a Dantzig shipbuilder, and a complete vessel, some thirty-nine feet long, of the type represented on the Bayeux tapestry, was the result. The vessel is now on view at the Dantzig Museum.

#### Disasters.

Last month I remarked upon the accident to the *S. Paul* which has followed the *Lahn* and the Royal Mail Line's steamer *Elbe* in having a disaster to a steam pipe. This was unfortunately attended with fatal results. It delayed the vessel a fortnight at New York. Unfortunately, too, as far as I am concerned, this note was lost in post, and it is now too late to repeat it, especially when we regard the more recent disaster which has befallen the vessel.

Another matter of interest was the breakdown of the *Scot* at Christmas. She encountered heavy weather on her outward voyage to the Cape, and when in the Bay it was found that the "shaftings of both screws were knocking heavily." The intermediate steamer of the Union Line, sailing a week later than she, called at Vigo for her mails and some passengers and a day or two later the remaining travellers were taken on by a special boat. No information as to the details of the mishap have yet transpired. We may, however, hope to hear something soon, as two powerful Liverpool tugs, the *Stormcock* and the *Blackcock*, were sent out for her on the 18th of January. Just a week later they delivered their big charge at Messrs. Harland & Wolff's yard, where the repairs are to take place. Now that the strike is at an end we shall probably soon see her back at work. If one may venture on an opinion one would be inclined to think that the mishap was due to the adoption of the principle in her case of a great length of shafting outboard, and that such casualties are hardly to be expected in the case of vessels built on the *Campania* and *Majestic* principle.

The Cunard steamer, *Cephalonia*, had a narrow escape on the first day of the New Year. She touched the rocks at the South Stack on her inward voyage from Boston during a very dense fog. She was, however, not going fast and the sea was very calm. The discipline and resource for which Cunarders have been famous for more than half a century, were conspicuous on this occasion, as in the old days, and the passengers were all safely landed. The vessel herself came afloat as the tide rose, and, declining assistance, the master made for Holyhead. The port reached, his vessel went down in the harbour. She lay with the water over her saloon decks, and with a list of 33 deg. The company undertook the work of lifting her up themselves, and after several days' hard work got her safely placed at a convenient spot higher up the harbour, where she was made ready for sea. Thence she was towed to Liverpool and there docked for complete repairs. It would appear that the accident, though probably unavoidable, will be an expensive one for the owners as the raising operations must have been very costly.

The Dominion Liner *Dominion*, a vessel which has recently been very thoroughly rejuvenated, met with a somewhat unusual accident. She was outward bound to Montreal and when off the Irish Coast her boiler feed-pipes were carried away. She was making water fast, and the proximity even of the inhospitable rocks of Brerhaven was a refuge which the captain eagerly sought to beach his charge. After considerable work this vessel also was got off and brought safely to harbour.

The *St. Paul* is an unlucky ship. I began this note with a reference to the fact that she had a fatal accident at New York. I conclude it with the tale of a stranding at Long Branch, New Jersey, as she again approaches her western terminus. There appears to have been, from the earlier accounts, a dense fog and an extraordinary current, which is said to have played a trick, not alone with her, but also with two other well-known mail boats. However this may be, the fact remains that she went ashore on the sand and took a great list. Fortunately, assistance was at hand, and the passengers and mails were landed without any difficulty. But at the time of writing she is still ashore. It is to be feared that this mishap will postpone the fulfilment of the promise of the American Line to add



a sailing every fortnight to their weekly service. There was talk last week of an increase in their sailings. Hitherto they have been weekly, and it was said that they would in future be thrice a fortnight.

*Appropos* of this I may mention the report that a German Line is about to commence a service between Boston, U.S.A., and the Fatherland. This of course would be *via* Southampton.

#### The Ostend Mail Line.

whose fleet was noticed in the last issue of this journal, have placed an order for another fast boat with the Cockerill Company at Hoboken. This seems to show that the Clyde has quite lost the Belgian Government's custom. The recent strike has probably had something to do with the matter.

#### A fixed Hour for Leaving New York

was adopted by the American Line last year, and the White Star Line has now followed the lead. This is not, as many persons seem to think, a new departure. It is merely a return to a custom which prevailed a great many years ago, it was the rule, in fact, in the early days of steam navigation on the Atlantic. It is, of course, a custom which was easier of inauguration at New York, where the rise and fall is comparatively slight, than at Liverpool, where the variation between high and low water is great. But Southampton has had the rule for some time, and since the dredging at the bar has been effected the Mersey port has got very near the same result. No doubt it will soon have to be as regular in its sailing hours as Southampton, when the new dredgers have had time to execute their work on the sand at the mouth of the Mersey.

#### The Mail of a Century Ago.

Some of my readers who are interested in the development of the Mail service may find an interesting account of the work of carrying the King's Mail across the sea, in war time, in the recent book of Mr. Norway, entitled, *The History of the Post Office Packet Service between the years 1793 and 1815*. This volume is compiled from researches amongst official documents. Fares, it appears, were high in those days, for the risks were great, even if the passenger had to share them, and at the same time, to endure what would now be considered utterly insufficient accommodation. The fare from Falmouth—the Plymouth and Southampton of the country rolled into one—was no less than thirty-five guineas to Gibraltar. There was, however, a chance of seeing some very serious fighting in these little craft, and with it, of course, the further possibility of viewing a French prison from the inside, for the Falmouth packet was limited to a burden of 179 tons, and had a very light armament, so that it had little chance of getting away from an enemy if it were engaged.

#### Deaths.

I regret to have to notice the deaths of two famous shipbuilders. The first to be referred to is Sir Edward Harland, M.P., the founder of the famous firm of Harland & Wolff, of Belfast. He passed away very unexpectedly, just before Christmas, from disease of the heart. He will always be remembered as the practical founder of the great Queen's Island Yard. True it is that a yard existed before he became its owner, but it was small and not financially successful. He made it great, made it prosperous, and made it an engineering establishment of the highest class as well as one of the greatest shipbuilding yards in these islands. Beginning with the Bibby Liners, he went on to build the White Star record breaker. He believed in long and narrow ships, and he found out how to make them safe and lasting as the old fashioned vessels never were. He got speed with comparatively low horse-power, and his lines, though very fine at the entrance and run, gave his models room for freight earning. Thus his vessels paid their owners. Though they were never dry ships, they never took on board solid water to injure them, and they gave the lie to all the old salts' prophecies as to the longitudinal weakness they would display in Atlantic seas. To Sir Edward the public owes the introduction of many of its luxuries, of which perhaps the chief is the midship saloon.

Mr. Schichau, the builder of torpedo boats at Elbing, has also been lost to the shipbuilding profession during the last few weeks. He was one who helped to bring the science of shipbuilding to its present important position in Germany, and his firm is now launching out into extensions with a new yard, where greater ships will add to their renown.

## NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondent.)

#### The Naval Outlook.

THE month of January has been a stirring one for the country. Scarcely had the immediate danger which seemed to threaten us from across the Atlantic passed away, than with the coming of the New Year there was trouble in the Transvaal. With Jameson's daring ride, and the futile rising of the citizens of Johannesburg, it does not fall within my province to deal, but naval action indirectly followed. A most indiscreet and uncalled-for telegram from the German Emperor to the Boer President, very naturally aroused feelings of deep resentment throughout the Empire. By the comments of the European press we were made to feel our isolation, an isolation, however, which has been rightly characterised as splendid, for it showed Britons throughout the world prepared to stand shoulder to shoulder in defence of their rights. There was no passionate outburst, no feeling of alarm, no ridiculous display of a Jingo spirit, but calm preparation and a unanimous expression of confidence on the part of everyone in the Government and Fleet.

#### Preparing for War.

The most striking incident in the situation is to be found in the measures which the Government, with the acquiescence of the people, saw fit to make. Here and there a cry was raised to put our land forces on a war footing, but when the *Times* announced that a Flying Squadron was to be mobilised, it was at once recognised that the right step had been taken. The defence of our world-wide Empire rests upon the fleet. To be prepared against aggression, it is manifest that the first thing to do is to increase our squadrons on active service. The vessels chosen for mobilisation were the two first-class battle-ships *Royal Oak* and *Revenge*, of the *Royal Sovereign* type, the first-class cruisers *Gibraltar* and *Theseus*, and the second-class cruisers *Hermione* and *Charybdis*, with six torpedo-boat destroyers. A squadron composed of such vessels is obviously, from its speed and power, eminently fitted for the purpose of a Flying Squadron; a force capable of being sent in an emergency to a threatened locality, or despatched, if needs be, to reinforce a fleet already in commission. In addition to this measure the Channel Squadron was supplied with six torpedo-boat destroyers, the only constituent in which it might have been held to be weak, and a portion of the squadron on the Cape station was ordered to proceed to Delagoa Bay.

#### Mobilizing the Flying Squadron.

The mobilization of the Flying, or to give it its official designation, the Particular Service Squadron, was carried out on Tuesday, January 14th, with the utmost thoroughness and celerity. At Portsmouth the *Revenge* hoisted the flag of Rear-Admiral Dale in command, and the *Royal Oak* and *Gibraltar* the pennants of Captains Burges Watson and Hughes-Hallett respectively. At Chatham the *Theseus* and *Charybdis* were commissioned by Captains Campbell and McQuhae. While at Devonport Captain Arbuthnot hoisted his pennant in the *Hermione*. At the same time in the three ports the following torpedo-boat destroyers were placed in commission. For the Flying Squadron the *Hart*, *Snapper*, *Shark*, *Starfish*, *Rocket*, and *Skate*; and for the Channel Squadron the *Handy*, *Havock*, *Lightning*, *Salmon*, *Sturgeon*, and *Surly*. The number of officers and men distributed among the 18 ships was 3,558, and by the evening of the same day the work of manning and commissioning was completed, and the vessels were practically ready for service. Thus without the slightest strain upon the machinery of mobilization, the 18 vessels were put upon a war footing, and although it would be a mistake to attribute undue importance to this circumstance, it may certainly be accepted as a promise of what can be done in a larger degree should necessity arise. The contrast between the manner in which the late Admiral Sir Geoffrey Hornby's Special Service Squadron was got together, and the ships composing it, with the present squadron and the new dockyard methods, is most striking, and demonstrates in the clearest manner the great improvement which has taken place in naval organization and material in the last ten years.

#### The Comparative Strength of Navies.

Very opportunely the Admiralty have issued a Parliamentary



paper giving a return of warships in commission and in reserve, the tonnage of Mercantile Marine, and the value of sea-borne commerce of the principal sea powers. The figures in this return afford ample food for reflection, for they show that in battleships alone the British Empire will possess, when those at present building are completed, just one more than France and Russia own between them. In the class of coast defenders, a type of vessel much more effective for war purposes to those Powers than to us, France and Russia will possess 15 more than we do. And it is obvious therefore, that if all our battleship force was operating on the enemy's coast, we might possibly find our numbers insufficient. On the other hand a comparison of cruiser strength gives us a total of 137 to 86 possessed by France and Russia. There is, however, small consolation to be found in these figures when the interests afloat to be protected are taken into consideration. The aggregate tonnage of the British Empire in ships of the Mercantile Marine amounts to more than 13,000,000, which is more than twice as much as the tonnage possessed by all the other nations of the world. If we look at the foreign cruisers as commerce-destroyers, and deduct from our own vessels needed as scouts, &c., of the fleet, we shall see that we have only too few for the work of adequately protecting our merchant marine and the cargoes they carry to the yearly value of nearly £965,000,000.

#### Portsmouth Dockyard.

The activity which has characterised the work of all the naval establishments for the last few months has been almost redoubled during January, new ships being taken on, new men being taken on, and more vessels put into commission with as little delay as possible. Moreover the authorities are showing renewed interest in the yard, and the first step in direction of lighting the workshops with electricity has been taken. Among ships soon to be completed may be mentioned the *Sultan*, which has undergone an exhaustive refit, although she still carries her 12-in. muzzle loaders. A week of unwonted excitement was that in which the mobilisation of the Flying Squadron took place, but everything worked so easily that no friction of any sort occurred. The manner in which the existing programme is being hurried on will be understood by just one reference; the following ships have been or are being completed at the rate of one a week. *Imperieuse*, only waiting for her gun mountings, *Melpomene*, *Sultan*, and *Inflexible*. Then the *Eclipse* was to have been finished in August, but may now be ready in May. The *Prince George* was to have been finished in December, but will be ready by October, and perhaps before. The *Gladiator*, laid down on January 27th, is also to be pressed on with despatch. More men have been employed in the yard than has ever been the case before, and quietly, persistently, and energetically the output has been increased. We have sent away the two squadrons, that of the augmented Channel, and the particular service, and now all hands are at work to replace the reserve vessels which are the equals of those sent away. As to the next year's programme, we are contented to know it will be a good one, and that it will probably contain a *Renown* and perchance a cruiser or two.

#### The New Shipbuilding Programme.

Speaking on January 21st, Mr. Goschen, as First Lord of the Admiralty, referred with pardonable pride to the recent mobilisation, and to the evidence it afforded of the improvement in naval organisation which he noticed to have taken place since he last occupied the responsible position at the head of our Sea Service. With regard to the new programme he said, "We shall not propose any sensational measures, but will go forward with that steady increase in the number of our ships and in the number of our men that appears to be necessary for the situation which may be described on the political horizon." This statement has been received with great satisfaction by the country, and with every confidence that it will, before long, be translated into action. Forecasts of the programme are often misleading, but this year we have, at all events, some ground to go upon. The Admiralty have already asked the private shipbuilders to tender for the construction of five additional third-class cruisers of a type similar to the *Pelorus*, which is to be launched on February 16th, at Chatham. This vessel, which is an improved *Barham* with heavier armament and 20-knot speed, is looked upon by professional critics with great favour as a very effective type for scouting and look-out work. The multiplication of such a vessel is very satisfactory, and although the authorities only admit an

intention to lay down five more it is highly probable that when the Estimates appear, five more will be found in a supplementary list, making twelve in all of this useful class.

#### Chatham Dockyard.

The threatening appearance of the horizon has had a marked effect on work in this establishment for which it was well prepared by the steady progress made during the past year in engine construction and rapid building. The new year has opened therefore with bright prospects. The grand work of the completion of the *Magnificent* bids fair to be equalled by that on the *Victorious*, launched, as will be remembered, in October, 1895. This vessel should soon make her trials and is to be ready for the pennant in September. The *Illustrious*, laid down in January, 1895, is also being pushed on, and the constructors for her machinery, Messrs. Penn & Sons, of Greenwich, have reported her engines completed and ready for fitting. The *Illustrious* by the way, is to be supplied with Martin's system of induced draught. The building of the cruiser *Vindictive* has been temporarily suspended in order to concentrate the work on other vessels, but she will be energetically pushed ahead as soon as men can be spared, and is to be finished by the end of the financial year. In the new ship-building programme this yard is promised a battleship and two cruisers, said to be of the *Renown* and *Hawke* types respectively, but more probably modifications of these vessels. The *Minerva* will be completed by October next, if not before, and the *Hannibal* is to come here when launched to be fitted for commission. Of ships being refitted the *Rupert* and *Audacious* are now the next important, the *Sens Pareil* having been finished and sent back to Sheerness. For the Particular Service Squadron the *Theseus* and *Charybdis*, with three torpedo-boat destroyers were commissioned, and the *Endymion* to carry relief crews to Australia, also hoisted the pennant. This work was done most expeditiously, although to supply part of their complements draught was made on the other naval ports. The work of repairing the *Repulse* after her coal bunker explosion was also completed. In spite of the fact that additional workmen have been taken on until the number employed in the yard stands higher than at any previous period, the Admiralty have found it necessary to give out some of the machinery which was to have been built here to private contractors. Two torpedo-boat destroyers have been delivered, and it is expected that several will arrive during February to complete.

#### New Work in the Dockyards.

In looking forward to the work which it may be anticipated will be put in hand by the Admiralty during the financial year 1896-7, we are more likely to learn in advance what will be done in the Dockyards than by the contract shipbuilders. In the latter case there is no necessity for making public the official intentions until tenders are invited; on the other hand, the dockyard officials must be consulted, and, therefore, it is impossible to preserve the same amount of secrecy. The report, therefore, that two vessels of the *Renown* type of battleship are to be laid down, severally at Portsmouth and Chatham, meets with general acceptance, and it is not beyond the bounds of possibility that the further story which gives to each yard, including Devonport, two cruisers of the *Arrogant* type, has also foundation in fact. The *Renown* class of battleship is as yet untried, and there is only one specimen of this class in existence, now completing at Devonport. What then we may probably expect to see, is a modification of the *Majestic* and *Centurion* classes on the displacement of the *Renown*, and possibly supplied with watertube boilers. Those who have, with Lord Brassey, advocated the construction of ships of more moderate displacement than is to be found in the *Majestic* and *Royal Sovereign* classes will probably find much cause for satisfaction should the Admiralty decide to build eight or ten battleships of this smaller class, while those who argue that the size of our battleships is a lesser consideration than their fitness for the work they have to do, may rest content in the knowledge that their opinion is shared in the highest quarters.

#### Sheerness Dockyard.

The date of the launch of the *Pelorus*, third-class cruiser, has been fixed for the 15th inst., and as soon as she takes the water her place will be taken by the *Proserpine*, a sister vessel. I must say that the *Pelorus* looks a beauty, and everyone, naval and civilian, who has been down to look at her, agree that she

ought to be a splendid little vessel. But other work has not been forgotten and the *Cleopatra* is so far advanced that it is certain she will be ready to take the place of one of the training squadron ships when the squadron returns home. The principal duty that has fallen to this yard in connection with the mobilisation has been in supplying ammunition, &c., to the vessels coming from Chatham. The *Empress of India*, *Republie*, *Blenheim* and *Endymion*, as well as the *Thesus* and *Charybdis*, and several torpedo-boat destroyers, have arrived and taken their departure: each one requiring attention of some kind from the establishment. Two new torpedo-boat destroyers, which hoisted the pennant at Devonport, viz., the *Skate* and *Sturgeon*, have now been attached to this port for manning and refitting purposes. The *Sunfish* and *Opossum* will also, it is expected, come down here from Chatham when ready for duty. All these small vessels, as well as those commissioned here for instructional purposes, are to be fitted in; the yards with installations of electric light in their engine-room and stokeholds. The *Castor* from Shields, is to be retained here as an overflow ship for the Gunnery school, until the barracks are enlarged, and she will take the place of the *Ruby*. The *Torch* has left for Chatham to join the "A" division of the Fleet Reserve, and the *Alert* will follow soon. These vessels are quite ready for sea, but it is understood that they will be retained at home for a little time in order that comparative trials of their machinery may be made. The *Speedy* and *Wye* have finished their refits and have left to follow their several occupations, the one as despatch vessel to the Channel Squadron, and the other to carry stores, &c., to Ascension. The *Hearty*, *Landrail*, and *Sheldrake* have also given work here in making good defects.

#### Trials of the "Phoenix."

The only vessel of a size larger than a torpedo-boat destroyer which has made her trials during the month just past has been the *Phœnix*, a new sloop built at Devonport. The results of both natural and forced draught trials were fairly satisfactory, a curious circumstance being that the speed realised in both cases was the same, namely, 13.4 knots. This is more than was expected, for the highest estimated speed was only thirteen. The following are the results of the two trials. For eight hours steaming with natural draught:—steam, 147 lbs.; vacuum, starboard 27 in., port 24.8 in.; revolutions, starboard 182.9; I.H.P., 1,181; air pressure, .61 of an inch; speed, 13.4 knots. For four hours steaming with forced draught:—steam, 149 lbs.; vacuum, starboard 26.1 in., port 24.9 in.; revolutions, starboard 196, port 204; I.H.P., starboard 752, port 739—total, 1,491; air pressure, 1.14 ins.; speed, by log, 13.4 knots. This vessel is armed with six 4-in. quick-firing guns, and four 8-pound Hotchkiss guns. The 4-in. gun is a new type only recently introduced into the service, and the loading, elevating, and training and gear of the gun during the trials gave great satisfaction.

#### Water-Tube Boilers.

The Admiralty continue to show their entire belief in the water-tube boiler, and their determination to try it in all its various types, and in vessels of all classes smaller than the battleship. Boilers of various designs have been, or are being, fitted in the *Speedy*, *Sharpshooter*, *Spanker*, and the torpedo-boat destroyers. The *Powerful* and *Terrible* have been supplied with the Belleville boiler, and the same type has been approved for several of the new first and second class cruisers. It seems likely also that this type will be fitted in future torpedo boats, for it is to be tried in No. 80. A more novel departure has been decided upon for the third-class cruisers *Bellona* and *Barham*, now attached to the Channel and Mediterranean squadrons respectively. These vessels are to have their boilers removed and replaced with those of the Thornycroft water-tube type. The third class cruiser *Proserpine*, which will shortly be laid down at Sheerness, will also be supplied with Thornycroft boilers, and it is considered likely that this type will be chosen as most suitable for the new third-class cruisers which are about to be built by contract as part of the new programme. The results obtained from these boilers as fitted in the *Speedy* have certainly been such as to justify this expectation. Engineers will look forward with the keenest interest to the future trials of all these ships, and it is undoubtedly the feeling that, whatever may be the case in the Mercantile Marine, the water-tube boiler has come to stay in the Royal Navy. Indeed, there are those who predict its use in the battleship of the near future.

#### Devonport and Keyham Yards.

The year has opened with good news for this establishment, for the tender of Sir John Jackson for the Keyham extension scheme has been accepted. The work is to extend over five years, but there is no question that it will result in placing the west country yard on a par with those further east if, indeed, it does not make it the finest in the kingdom. In addition to the enlargement of Keyham the Engineering College is to be improved by the addition of two blocks of buildings. Meanwhile everything continues to be pushed forward as if the Government deemed the moment to be one of some urgency, and hundreds of shipwrights have been working overtime, chiefly in connection with the *Renown* and the *Talbot*, so that the former will now be ready for commissioning by the end of June and the latter by the end of May. The prospect of additional work is also exceedingly good, and the near future of this yard has a very rosy look. Not only have the Western divisions of the Channel and Particular Squadrons, with half a dozen destroyers, been turned out of hand in all respects efficient and effective, but the *Black Prince* has hoisted the pennant as a training ship for boys, to be stationed at Queens-town, and the *Rupert* has been refitted, and has gone to Gibraltar under convoy of the *Endymion*, which is on her way to Australia. Altogether the last weeks of the month have borne a resemblance to mobilisation in the summer. Of the seven vessels commissioned for the Particular Squadron but one came back again, the *Rocket*, torpedo-boat destroyer, having developed defective boilers. She has since rejoined the squadron. This is a sufficiently good record for the past, and the belief that two new cruisers will be laid down very shortly after March gives good provision for the future. The *Arrogant* is the next ship to be ready for launching.

#### Fighting Tops and Machine Guns.

It was at one time asserted that the experience at the Yalu went to show that fighting tops were not of much account. The men in the tops of the Chinese ships were, it is asserted, speedily killed or driven from their guns. There is now, however, good cause for doubting if we should be right in accepting at its face value such a story, or drawing from it lessons for our own fleet without large deductions. There was, however, one feature in connection with the fighting tops which was certainly capable of improvement. It has until lately been the system to trice up the ammunition for the guns by means of a davit and pulley, a method most hazardous in time of action. A new plan has now been tried on board the *Majestic* at Portsmouth, and has been found to work so promptly, quickly, and efficiently that it is most probable that the principle will be adopted in all future ships if not adapted to those which are already fitted with fighting tops. By this new plan the ammunition is sent up inside the mast. The apparatus, weighing about a couple of tons, and consisting of a cage which can carry twenty projectiles from the magazine below to the platform above. In the experiments made the apparatus worked with the utmost smoothness and without the slightest hitch. It is manifest that by means of this hoist inside the mast we not only obtain protection, but an acceleration of fire which it is highly desirable to obtain.

#### Pembroke Dockyard.

If this establishment has not felt the "sturm and drang" of the crisis to the same extent as its larger sisters at Portsmouth, Chatham and Devonport, it is because it is a building and not a fitting yard, and therefore goes on with its daily toil without the bustle of commissioned ships. But for all that, good solid work has been done, and the *Hannibal* will certainly be launched on the date originally fixed, for on both this vessel and on the *Andromeda* overtime has been the rule of late. In fact the activity prevailing at the yard has not been equalled for years past, and the impetus thus given is sure to make itself felt later on. When the *Hannibal* is launched she will go to Chatham to be completed, a proceeding which it will be remembered was carried out in the case of other vessels built here. At present there has not been any official intimation about the work in connection with the new programme which this yard is certain to receive, but rumours of two battleships of the *Renown* type are rife in this establishment, and it is frequently the case that these rumours are found to have some substantial basis. It is now known to be a fact that the Admiralty intend to build a new jetty, and certain officials from Whitehall have paid us a

visit for the purpose of selecting a site. It is hoped that in addition to provision for this useful addition to the yard, other items will be found in the Estimates when submitted to Parliament.

#### The Torpedo Boat Destroyers.

There were many forbodings when it was announced that the Admiralty were about to increase and augment our torpedo boat flotilla, by building nearly 50 vessels of a new and untried design. Recent events, however, have shown that the Naval authorities were not taking this step with their eyes shut, and now it is generally acknowledged that the torpedo-boat destroyers are a success. They are not very comfortable to live in perhaps, but very useful little ships, only needing crews thoroughly accustomed to their ways to be most effective additions to the country's naval strength. It has already been announced in the *MARINE ENGINEER* that nine of these vessels have been commissioned, three of each at the naval ports as instructional boats, and to be ready for emergencies. To these nine the Admiralty have now added a dozen more in groups of six each to the Channel and Particular Service Squadrons. These boats have been thus allotted. From Devonport, the *Sury* to the *Magnificent*; the *Sturgeon* to the *Repulse*; the *Starfish* to the *Revenge*; the *Shark* to the *Royal Oak*; the *Skate* to the *Charybdis*; and the *Rocket* to the *Hermione*. From Portsmouth, the *Handy* to the *Resolution*; the *Havock* to the *Royal Sovereign*; the *Hart* to the *Gibraltar*. From Chatham, the *Lightning* to the *Majestic*; the *Salmon* to the *Empress of India*; and the *Snapper* to the *Theseus*. That these two squadrons should be accompanied by boats of this character is a measure which will commend itself to all who have studied the course which naval warfare in the future promises to take. And it is a very reassuring fact that we should have more than a score of such handy vessels in commission in the Channel ready for any emergency. What is even more to be dwelt upon is the circumstance that all these vessels should have been sent to sea at short notice with scarcely a hitch worth mentioning, or the development of a serious defect.

#### THE INSTITUTION OF JUNIOR ENGINEERS.

THE eleventh anniversary dinner of this Institution took place on January 25th at the Westminster Palace Hotel, the president, Mr. Archibald Denny, being in the chair. Among other gentlemen present were Sir Donald Currie, M.P., Mr. A. J. Durston, C.B., Engineer-in-Chief of the Navy, Mr. James Dunn, Acting Director of Naval Construction, Mr. John Denny, M.P., Mr. E. Windsor Richards, Professor Biles, Mr. J. M. Gray, Professor Perry, Mr. H. J. Young, chairman of the council, and Mr. Dunn, secretary.

The chairman, in proposing the health of "The Queen," asked those present to join him in expressing the deep sympathy all felt with her Majesty in her present sad affliction.

"The Army, Navy and Auxiliary Forces," was proposed by Mr. John Denny, the names of Mr. James Dunn and Mr. A. J. Durston being coupled with it. After showing, by recent events, the preparedness of this country in case of war, the speaker ventured to think that there was but little to complain of in the work of the officials of construction department, and taking the Navy as a whole, it was one to be relied on to perform its duty in any emergency. The speaker feelingly alluded to the death of Prince Henry of Battenberg.

In responding to the toast, Mr. James Dunn said that he was impressed by the marvellous strides made by the men of that branch of science in which the company present were engaged. To-day we had a 50-ton gun of greater penetrating power than the 100-ton gun of only a short time ago, and a 6-in. armour plate of greater resisting force than the 12-in. plate of a few years ago, and one-seventh the weight of metal that was required for a horse power some time ago now sufficed, while so complete were the engineering appliances of to-day, that a monster battleship had been made ready for sea within two years of its inception.

Mr. A. J. Durston also replied. He referred to the strenuous and successful efforts made by successive Governments to maintain our Naval supremacy, and that they had met the approval of all parties in the State had been clearly indicated by recent political events. Not only did our Navy surpass those of other

nations but our powers of construction were so great that the increase of our superiority in warships to any extent became merely a question of money.

The chairman in proposing "The Mercantile Marine" spoke of changes that have occurred in the past 15 or 20 years, and testified to the increase in the number and importance of the "tramps." The Mercantile Marine might now be roughly divided into "tramps" and "liners" and he thought the tonnage of the "tramps" would preponderate. After dealing with the introduction of triple and quadruple engines, and the economy thereby effected the speaker touched upon the question of the depreciation allowed by the Inland Revenue when assessing the present value of a vessel.

Sir Donald Currie, in replying to the toast, observed that if Mr. Denny were correct in regard to the question of depreciation, the logical sequence was that the shipowner should get much lower prices from the shipbuilder, and he thought the look-out for owners was not a bright one unless they could get a good small price to begin with. In the course of a most interesting speech, Sir Donald dealt with the changed conditions that the business of shipowning had undergone during the past twenty years, and in conclusion touched upon recent events in South African affairs in a tone of moderation and conciliation worthy of the speaker and the occasion.

#### OBITUARY.

##### THE LATE SIR EDWARD J. HARLAND, BART.

WE regret that, owing to the special nature of our last issue, and the intervention of the Christmas holidays, the news of the lamented death of Sir E. J. Harland did not reach us in time to admit of the preparation of the following notice before going to press.

The son of a well-known medical man practising at Scarborough, the late baronet was born at that town, in May, 1831, and died shortly after midnight on December 23rd last, at Glenfarne Hall, county Leitrim, from a sudden attack of heart disease, which proved fatal with terrible swiftness, he having only retired to his bedroom, in apparently good health, one hour before his decease.

A hard worker in any cause that he undertook, and possessed in no small measure of the sterling integrity, courage, and shrewdness, naturally to be expected of one who claimed to be a Yorkshireman, and of Yorkshire parentage, Sir Edward Harland has left his imprint on contemporary history as one who, for well-nigh a quarter of a century, stood in the very forefront of his profession, and though some may have thought him of hasty temperament (and it was a fault he always frankly acknowledged and honestly deplored), there are many more who have cause to ever remember him as a kind and generous friend.

As a youth we find him apprenticed to Robert Stephenson & Co., at Newcastle, on his 15th birthday, and having served five years—four in the shops and one in the drawing office—he was, in May, 1851, at once taken on as a journeyman at 20s. a week wages.

Quitting Stephenson's, he made a brief visit to London and to his home at Scarborough, afterwards joining Messrs. J. & G. Thomson—then only engine builders—at Glasgow. Soon afterwards, the firm commenced shipbuilding, and Mr. Harland succeeded to the post of head draughtsman. His stay with the great Clydebank firm was, however, of brief duration, as we find him in the latter part of 1853 filling the post of manager in Mr. Thos. Toward's shipyard on the Tyne. His sojourn here was also brief, but his next change was destined to be his last one, for, replying to an advertisement in 1854 enquiring for a manager to take charge of a shipyard in Ireland, he obtained the post, and the end of that year saw him duly installed as manager of the establishment that shortly afterwards became his own property, and of which he was head at the time of his death.

The firm he joined was known as Robert Hickson & Co., the yard being at Queen's Island—then actually an island, and held on lease from the Belfast Harbour Commissioners.

It is somewhat of a coincidence that his connection with the yard should have opened and closed with labour troubles, for having succeeded a very lax manager, Mr. Harland's sterner methods gave offence to the men, and a strike resulted. Eventually the new manager won his battle, but previous bad manage-

ment had crippled the firm, and an arrangement had to be made with the creditors.

Having pulled the business together again and satisfactorily carried out the building of a number of vessels, Mr. Harland intimated his intention of starting on his own account, and in the end he purchased the business, by the assistance of a friend—Mr. Schwabe, of Liverpool—and thus commenced his long and prosperous career as a shipbuilder.

Mr. G. W. Wolff, a nephew of Mr. Schwabe's, was at that time acting as assistant in the yard, and joining in the business as partner shortly after its purchase by Mr. Harland, the now world-renowned firm of Harland & Wolff was founded.

Of Sir E. J. Harland's public life we have nothing to say, nor shall we attempt to deal with the rise and progress of the firm, as it would be beyond the scope of the present notice, even were it within the bounds of our space.

## ✓ LIST OF VESSELS LAUNCHED IN 1895.

### ENGLISH.

By THAMES IRON AND SHIPBUILDING CO., Limited, Blackwall.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. I.
† Samoyede .. ..	Steel	Steam	Foreign	—	1,050
† Zebra .. ..	"	"	British	224	4,500

By Cox & Co., Dock Ironworks, Falmouth.

Thistle .. ..	Steel	Tug	—	101.47	—
* Sir Fredk. Chapman .. ..	St'l Shth'd with Teak	Steam	—	80	260
* Otter .. ..	Steel	St. Yt.	—	121.38	840
* Ferndale .. ..	"	Tug	—	37.89	110

### AMERICAN.

By CLEVELAND SHIPBUILDING CO., Cleveland, O., U.S.A.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. N.
† Chili .. ..	Steel	Steam	American	2584.88	182
† Yale .. ..	"	"	"	8453.26	262
† W. V. Rees .. ..	"	"	"	3580	262

estimated

By CHARLES HILLMAN, Ship and Engine Building Co., Philadelphia, U.S.A.

* No name .. ..	Steel	Steam	American	62	250
Katharine (A) .. ..	Wood	"	"	75	90
Lorraine .. ..	"	"	"	75	90
† Paoli .. ..	Steel	"	"	331	860
No name .. ..	Wood	Barge	"	80	—
Endeavor .. ..	Steel	Steam	"	250	350
Papoose .. ..	Wood	"	"	11	80

### SWEDISH.

By MOTALA VERKSTADS NYA, A.B., Motala, Sweden.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. N.
* Bravikan .. ..	Steel	Steam	Swedish	60	45
* Vestovoi .. ..	"	"	Russian	16.53	40
* Lisij-noss .. ..	"	"	"	90.42	60
* Sestoretsoh .. ..	"	"	"	90.42	60
* Lotameister .. ..	"	"	"	21.50	50
* Nestolan .. ..	"	"	"	56.56	100

### ITALIAN.

By CANTIERE POLI, Chioggia Venice.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. N.
† San Marco .. ..	Steel	Steam	Italian	83	150
No. 3, Cargo Boat .. ..	"	—	"	80	—

\* Compound.

† Triple

The above arrived too late for publication in our January number.

**A New Style of Rig.**—The *Titania*, built by Messrs. Russell & Co., Port-Glasgow, of which we gave an account in our November number, is somewhat of a novelty in sailing vessels. The rig is that of a four-masted barquentine, with modifications, and the vessel might be appropriately called a barquette. On the foremast she carries a full spread of square canvas, while on the other three masts the principal sails are fore-and-afters. It has been found from experience that on a vessel of this size the usual style of fore-and-aft—that is, with gaffs spreading the heads of the lower sails—caused a large amount of wear and tear, as in a seaway it was impossible to control the gaffs and prevent them from swinging about, thereby bringing a great strain on the after leeches of the sails. To obviate this, Captain Fairlie has introduced and patented a new style of rig, which will be used on the *Titania*. On the main and mizzen masts the lower fore-and-afters, instead of having the usual heavy gaffs, are almost jib-headed, having only short spreaders on the heads. These sails hoist to the crossrees, and are fitted with patent roller-hanks, also an idea of Captain Fairlie's, and when tried were found to work without the least friction. Above these a gaff topsail is set, extending from the topmast head, and spread by a boom fixed on the lowermast head. To make up for the shortage of canvas caused by the gaffs being done away with, there is a jackyard slung under the crossrees on the mizzen and jigger masts. On each of these are set two triangular sails. The inner leech of the lower one travels up and down a wire jackstay on the fore part of the mast, the outer clew being attached by a specially fitted swivel hank to a wire jackstay, stretched from yardarm to yardarm, so that the sail can be easily hauled out, to which may, for the time being, be the weather yardarm. The upper sail travels on a wire jackstay from the crossrees to the masthead, and also hauls out to, which may happen to be, the weather yardarm. The working of these sails was thoroughly tested after they were bent, and proved highly satisfactory. The *Titania* is also fitted with a deep-water ballast tank situated amidships, and capable of holding 500 tons of water, with which amount she can go anywhere under sail. This compartment is so constructed as to be suitable for carrying any kind of cargo. The vessel has also on board a donkey engine, by which the ballast tank can be either filled or emptied, and which is also available for lifting the anchor, discharging cargo, hoisting sails, or warping the ship about.

The "*Pennsylvania*."—It has transpired that the large steamship on the stocks in Messrs. Harland & Wolff's for the Hamburg American Co., is to be called the *Pennsylvania*. In point of size it will eclipse anything now afloat. The length of the vessel will be 560 ft., the beam 62 ft., and the depth 42 ft. The displacement tonnage will be 20,000 tons. There will be 80,000 tons of cargo capacity, and accommodation for 1,500 steerage, and 200 saloon passengers. The *Pennsylvania* will be ready early next year.

**Fairfield Shipbuilding Yard.**—We understand that Mr. Wm O'Brien, who has been in the employ of the Fairfield Shipbuilding and Engineering Co., Limited, since 1868, has just now severed his connection with that firm. During this period he held the position of outside manager for the last sixteen years, and successfully engaged, amongst others of our noted greyhounds, the *Arizona*, *Alaska*, and *Oregon*, for the Guion Line; *Umbria*, *Etruria*, *Campania*, and *Lucania*, for the Cunard Co., and steam yachts *Livadia* and *Peter the Great*.

**Spanish Decoration for a British Engineer.**—Mr. James McKechnie, engineering manager at the Naval Construction and Armaments Co.'s establishment at Barrow-in-Furness, has received the ancient decoration of Commander of the First Class of the Royal Order of Isabel la Catolica, which has been conferred on him by the King and the Queen Regent of Spain, in recognition of services rendered to the Spanish Navy while he was manager of the engineering works on the Nervion at Bilbao, where he designed and constructed the machinery for three belted cruisers, and did other valuable work. These cruisers—the *Infanta Maria Teresa*, *Viscaya*, and *Oquendo*—proved most successful, for although entirely armoured and with heavy artillery, they attained a speed of 20½ knots on trial.

**Speed Trials.**—Mr. Frank Caws, architect, of Sunderland, has received from the German Admiralty a fleet of six model ships of the German Navy, including the Emperor's yacht *Hohenollern*, with orders to make speed trials with them in his experimental speed tank.

## NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from December 23rd, 1895, to January 27th, 1896:—

Anstey, William J., chief engineer to the *President*, additional for department of Controller of the Navy, at the Admiralty, to date December 31st.

Arthur, John F., assistant engineer to the *Sharpshooter*, to date December 31st.

Baker, Alexander, engineer to the *Magnificent*, additional for the *Surly*, to date January 14th.

Bath, Frederick, (probationary) assistant engineer to the *Arcthusa*, to date January 16th.

Bolt, Charles W., engineer to the *Theseus*, additional for the *Snapper*, to date January 14th.

Bolton, Arthur W., engineer to the *Excellent*, additional for the *Vernon*, to date January 4th.

Bone, Howard, engineer to the *Pembroke*, additional for service in Chatham Dockyard, to date December 31st.

Bourke, Henry G., fleet engineer to the *Victory*, additional for duty in the Reserve, to date January 1st.

Bromley, W. (A), staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Brown, Percival R. T., assistant engineer to the *Endymion*, to date January 14th.

Canning, Henry T., assistant engineer to the *Polyphemus*, to date January 16th.

Carnt, Edwin C., chief engineer to the *President*, additional for service at the Admiralty, to date January 5th.

Carter, Edwin, engineer to the *Excellent*, additional for the *Vernon*, to date January 4th.

Chope, William D., engineer to the *Repulse*, for the *Sturgeon*, to date January 14th.

Clegg, Hubert J., assistant engineer to the *Gleaner*, to date January 16th.

Cook, John A., engineer to the *Vivid*, additional for the *Hussar*, to date January 25th.

Coomber, T. G., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Cornish, E., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.

Crowle, Joseph N., engineer to the *Royal Oak*, additional for the *Shark*, to date January 25th.

Crowley, Edward A. E., engineer to the *Tamar*, additional for Hong Kong Yard, to date January 3rd.

Darley, Arthur C., engineer to the *Hibernia*, additional for charge of machinery and reserve stores, working parties at Malta, to date January 16th.

Dart, Frederick H., chief engineer to the *President*, additional for service at Woolwich, as resident inspector of Whitehead torpedoes under construction.

Denbow, William, engineer to the *Pembroke*, for the *Sunfish*, to date January 1st.

Drake, Percy G., engineer to the *Hibernia*, for service with inspector of machinery, to date January 16th.

Ellis, E. F., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.

Fawcner, Sherard M. O., assistant engineer to the *Excellent*, additional for the *Vernon*, to date January 4th.

Follett, Samuel G., fleet engineer to the *Excellent*, additional, to date January 4th.

Ford, Hugh L. M., assistant engineer to the *Trafalgar*, to date January 16th.

Foster, Edward M., assistant engineer to the *Ramilles*, to date January 16th.

Fussell, John S., chief engineer to the *Victory*, for the *Invincible*, to date January 24th.

Godbeer, Samuel, engineer to the *Pembroke*, additional for service in Chatham Dockyard, to date December 31st.

Graham, Francis, (probationary) assistant engineer to the *Hood*, to date January 16th.

Grant, Arthur E., engineer to the *Pembroke*, to date January 10th.

Guyer, Thomas S., engineer to the *Revenge*, additional for the *Starfish*, to date January 14th.

Ham, John W., engineer to the *Royal Sovereign*, additional for the *Havock*, to date January 14th.

Hamm, B. S., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Hamm, Richard S., fleet engineer to the *Endymion*, to date January 14th.

Hammond, Henry T., staff engineer to the *Victory*, additional for the *Hercules*, to date January 1st.

Hayes, Ernest, engineer to the *Victory*, to date December 16th.

Head, Ernest A. W., engineer to the *Majestic*, additional for the *Lightning*, to date January 14th.

Hender, William J., engineer to the *Victory*, additional for the *Rattlesnake*, to date January 8th.

Hobbs, Philip, engineer to the *Resolution*, additional for the *Handy*, to date January 14th.

Jacobs, Frederick G., engineer to the *Goldfinch*, undated.

Kempt, Alfred R., (probationary) assistant engineer to the *Nile*, to date January 16th.

Kerr, Alexander, chief engineer to the *Victory*, additional for the *Calliope*, to date January 1st.

Lakeman William B., (probationary) assistant engineer to the *Barfleur*, to date January 16th.

Little, Edwin, staff engineer to the *Victory*, additional for the *Cesar*, to date December 31st.

M'K. Norris, Colin, chief engineer to the *Excellent*, additional for the *Vernon*, to date January 4th.

Murray, G., engineer to the *Humber*, to date January 3rd.

Newton, George S., fleet engineer to the *Edinburgh*, to date January 1st.

Owen, John A., assistant engineer to the *Rodney* to date January 16th.

Pellow, Charles H., fleet engineer to the *Penelope*, to date January 20th.

Pellow, Charles H., fleet engineer to the *President*, additional as Resident Overseer at Elswick, for inspection of mountings of naval guns.

Perkins, George L. R., chief engineer to the *Pembroke*, for care of gunboats and torpedo-boats, to date January 1st.

Phillips, Richard, chief engineer to the *Excellent*, additional for the *Vernon*, to date January 4th.

Ramsey, George, chief engineer to the *Vivid*, additional for the *Blanche*, to date from the day following that on which the *Blanche* pays off.

Raper, Robert St. J., engineer to the *Charybdis*, additional for the *Skate*, to date January 14th.

Rigler, G., fleet engineer, has been placed on the retired list.

Riley, William H., fleet engineer to the *Repulse*, to date December 31st.

Roberts, Ivor E. S., assistant engineer to the *Collingwood*, to date January 16th.

Robertson, Gordon, assistant engineer to the *Vivid*, to date January 11th.

Rodet, Ernest W., engineer to the *Gibraltar*, additional for the *Hart*, to date January 14th.

Rolle, Abesalom E., engineer to the *Royalist*, undated.

Rudd, Charles, fleet engineer to the *President*, additional for service at the Admiralty, to date January 5th.

Rush, Henry C., engineer to the *Victory*, additional for the *Terrible*, to date December 31st.

Sanders, John S., (probationary) assistant engineer to the *Assen*, to date January 17th.

Soreech, S. A., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.

Soreech, Samuel A., chief engineer to the *Swallow*, to date December 1st.

Spence, Robert, assistant engineer to the *Wildfire*, additional for the *Sans Parail*, to date January 1st.

Spriddle, William P. C., assistant engineer to the *Endymion*, to date January 14th.

Spry, Frederick M. D., engineer to the *Hermione*, additional for *Rocket*, to date January 14th.

Stribling, W. S., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Stokes, Walter, assistant engineer to the *Majestic*, to date December 13th.

Sutton, Arthur W., assistant engineer to the *Berkham*, to date January 16th.

Sutton, Francis J., assistant engineer to the *Excellent*, additional for the *Vernon*, to date January 4th.

Sutton, Francis J., assistant engineer to the *Australia*, to date January 16th.

Taylor, G. B., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.

Taylor, G. B., chief engineer to the *Pembroke*, additional for the *Alarm*, to date November 16th.



Tuckwell, Henry M. S., assistant engineer to the *Repulse*, to date January 10th.  
 Walmaley, U. A., fleet engineer has been placed on the retired list, with permission to assume the rank of inspector of machinery.  
 Wallis, Henry, chief engineer to the *Pembroke*, additional, for the *Leander*, to date January 1st.  
 Watkins, Benjamin J., engineer to the *Royal Oak*, additional, for the *Shark*, to date January 14th.  
 Watkins, Benjamin J., engineer to the *Hermione*, additional, for the *Rocket*, to date January 25th.  
 Willby, Richard G., staff engineer to the *Northampton*, to date December 24th.  
 Williams, Harry, assistant engineer to the *Excellent*, additional for the *Vernon* to date January 4th.  
 Willoughby, James T., engineer to the *Empress of India*, additional, for the *Salmon*, to date January 14th.  
 Wood, William H., engineer to the *Victory*, additional, as assistant to chief engineer in charge of drawing office, Portsmouth, to date January 5th.

## HOAR & BROWN'S ANNUAL HARDWOOD MARKET REPORT, JANUARY 6th, 1896.

		1895		1894.	
		Loads.		Loads.	
TEAK :		Timber	Planks	Timber	Planks
Imports	Moulmein	2,648	199	3,749	417
	Rangoon	10,844	2,909	3,481	1,630
	Bangkok	4,133	1,181	133	94
	Total	17,619	4,289	7,363	2,131
Deliveries	Moulmein	2,947	302	3,015	393
	Rangoon	9,531	2,143	3,874	2,080
	Bangkok	2,297	839	727	355
	Total	14,775	3,284	7,616	2,838
Stock, Dec. 31st	Moulmein	1,837	353	2,142	456
	Rangoon	3,804	1,949	1,991	1,173
	Bangkok	2,169	465	333	123
	Total	7,810	2,757	4,466	1,752

The above figures show a great increase in both the imports and deliveries from London during the past year, as compared with 1894. This is accounted for by the fact that H.M. Admiralty instead of taking direct shipments, satisfied their requirements (7,000 loads) from stocks in the Docks. Deducting the quantity thus delivered, the general consumption was not satisfactory, showing only a slight increase over the very low figures of 1893.

The demand, which was very inactive during the earlier part of the year, became fairly brisk as the year advanced towards the close. The improvement in trade, together with the low prices ruling, probably induced consumers to buy rather more freely. The stock of logs show an increase of 2,844 loads, being an excess of nearly 61 per cent. over that of 1893.

The figures relating to supplies chartered for and already afloat are as follows:—

Moulmein and Rangoon, about 19,000 loads, as against 26,700 loads at close of 1894. Bangkok about 13,500 loads as against 18,800 loads at the close of 1894. Total for 1895, 37,500 loads. Total for 1894, 45,500 loads.

From these figures it will be seen that the supply from Burmah will be smaller than usual, whilst the shipments from Bangkok will be once again very heavy. It is therefore difficult to forecast the future of the market, for whilst consumers generally prefer Burmah wood, Bangkok is being taken much more freely than heretofore, and as this class of timber as a rule is quoted lower, it will be the means of checking any advance that might have been fairly looked for from the smaller supply of Burmah timber.

TEAK PLANKS.—The imports were heavier than we have had to report before, and although the deliveries show an increase over the previous year, the demand was not sufficient to meet the enormous supply.

Prices as a natural consequence were depressed, some of the imports leaving much to be desired in the way of quality.

There is no doubt that planks are being more generally used, and if shippers would pay greater attention to the composition of the parcels, shipping planks of greater average length instead of short useless wood, of which there has been such a large quantity imported, the business would be increased, and become more remunerative to all concerned.

The stock on hand being heavy, any great increase can only have the effect of further depressing prices.

	1895.		1894.	
	Ft. super.		Ft. super.	
Imports ... ..	7,170,579		12,913,964	
Deliveries ... ..	10,291,875		12,764,498	
Stock, 31st December	3,123,684		7,244,980	

The imports show a falling off of nearly 40 per cent., the arrivals being the lowest recorded for a long period. The market was very depressed in the earlier part of the year, and the stock generally of an indifferent character. Prime wood always commanded good prices, but the inferior qualities, which formed the greater part of the stock, were almost unsaleable.

The falling off of the supplies, whilst the consumption was fairly maintained, has left the stock the smallest since 1890. Prices rapidly advanced during the latter part of the year, and there is no doubt that present prices will be maintained for a considerable time to come.

Advices all point to a very restricted supply both from Tobacco and Honduras, and until the political troubles in Cuba are settled, it is fair to assume that shipments will be suspended from there.

African does not grow into favour in this market, but the scarcity in Honduras and Tobacco has somewhat forced consumers to buy this wood, and it may be that many will gain an experience that may find it a better market than that now existing.

CEDAR.—The imports are fully 76 per cent. less than in 1894, and the deliveries 27 per cent. less. The stock is the lightest recorded since 1889. The small supply caused a rapid advance in prices for wood of ordinary quality, logs fit for boat-building purposes being almost unobtainable.

PADOUE.—The stock is heavy, and far beyond the demand. Notwithstanding the advance in the price of mahogany, for which it has been used as a substitute, enquiries are very inactive. The short lengths of the logs seriously militate against the sale of the wood, and if the logs were better manufactured the sale of timber would be very much increased.

GREENHEART.—The demand has been very light, and the stock on hand, viz.: 292 loads, is ample for some long time to come, unless the consumption of the past year is considerably increased.

KAWIR PINE.—There has been a good steady business done in this useful wood during the whole of the year, and whilst imports are kept within reasonable limits and present quotations remain, there is no doubt the timber will grow into favour.

	1895		1894.	
	Logs.		Logs.	
Imports ... ..	1,389		4,200	
Deliveries ... ..	3,429		4,884	
Stock, 31st December	643		2,783	

Once again we have to record the smallest import known for several years, being about one-fifth of the quantity imported in 1893. In consequence of the inferior character of the wood, prices have not shown the great advance that might be anticipated from such a short supply. Good logs are in great demand, and would realise high prices at the present moment.

WALNUT AND OAK LUMBER.—The depression was very much marked throughout the major part of the last twelve months, but towards the latter end stocks became considerably reduced, and values for fresh goods were firmer, old stocks were released and the way cleared for a better tone all round. Plain oak is now in good demand.

AMERICAN WHITEWOOD.—Logs.—The demand has been steady, prices, although low at the commencement, recovered somewhat as the season advanced, and at the moment quotations are considerably higher.

LUMBER.—The foregoing remarks as to logs applies equally to boards and planks. The prospect of all classes of whitewood is encouraging, and the consumption is likely to be largely increased as the price of mahogany has advanced so greatly.

**SEQUOIA** (California Redwood).—The low prices which prevailed have been the means of forcing into consumption the bulk of the heavy stock left over from last year. For that which remains on hand, the prospect is much more favourable, and the holders may look with confidence for a better realization.

**SATIN WALNUT**.—During the early season quotations were very low consequent upon the arrival of large inferior consignments, but latterly a firmer tone has prevailed, as the result of curtailed shipments, and business promises to become more remunerative.

**ROSEWOOD**.—The demand was quiet, and business of a restricted character. There is now a little better feeling and enquiries are more numerous. The landings were only 141 planks, whilst the deliveries amounted to 1,211, leaving a present stock of 876 planks. An advance in prices may be expected.

"Do not prophesy unless you are sure" is an old saying, but if it was rigidly adhered to the interest in timber market reports would decline, because it is the probable future and not the past which is of most interest. We enter the year 1896 with numerous difficult political problems for solution, but apart from this there is no doubt that throughout the world trade is showing signs of expansion, despite the operations of many adverse influences, and the tendency in the case of all classes of timber especially, is for an upward movement.

## INDUSTRIAL AND TRADE NOTES.

### THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

**T**HE Clyde engineering dispute, which at one time looked like ending in one of the most serious labour troubles in the history of the industry, has now been brought to an end, and the engineering establishments on the Clyde, which have been idle for three months, are now again in full swing. The terms accepted by the men are practically the same as those balloted on five weeks ago, with the exception that the advance is to take effect immediately on the men resuming work, instead of after an interval in which the employers might complete contracts taken at cheap rates. An advance is promised of a halfpenny an hour to all men paid below sevenpence, and a farthing an hour to all paid at or above that rate, these terms to hold good for six months, dating from 6th December last, and intention of any proposed change to be notified one month in advance. The terms were kept secret until the day fixed for the men to record their votes—the 18th ult.—in consequence of which the men were prevented from exercising the consideration demanded by the circumstances. The ballot was also taken simultaneously in Glasgow, in Greenock (and in Belfast), so that the result in one place might not influence the voting in another. In Glasgow the result of the ballot was received with a great deal of satisfaction, the men cheering lustily when the figures were read as follows:—

For Employers' offer	...	...	...	1,297
Against " "	...	...	...	430
Majority for				867

In Greenock, the result of the ballot was much more favourable:—

For Employers' offer	...	...	...	432
Against " "	...	...	...	85
Majority for				397

This result, as would be expected, brought about a thorough change in the temper and spirit of the men in the Clyde district, as the belief was generally expressed by the result that the strike was over.

They were considerably disappointed however, at the news from Belfast, which was of an unexpected and surprising nature, and at the time left everyone in a state of suspense as to whether

Clyde men would be allowed to resume work while those in it continued on strike. The Belfast vote was as follows:—

For Employers' offer	...	...	...	147
Against " "	...	...	...	644
Majority against				497

The Clyde engineers were naturally annoyed to think that a minority of the men affected should be able to prolong a struggle which they desired to end, and which the Belfast men had been the originators of. During the few days succeeding the voting day, the executive of the A.S.E. reconsidered the situation, and probably influenced by outside opinion, concluded it advisable, in the interest of all concerned, to intervene and compel the Belfast men to accept. This course was resorted to, and pressure being brought to bear on the Belfast employees, they gave in on Friday, the 24th ult., under protest, however, and after considerable discussion. With this decision the unfortunate labour war became a thing of the past, but not without leaving in its trail evidence of its long and disastrous existence.

The Watt Anniversary lecture of the Greenock Philosophical Society, was delivered in the Watt Museum Hall, Greenock, on the night of the 17th ult., by Professor W. C. Unwin, F.R.S., M.I.C.E., who lectured on "The Life and Work of Hirn, and the Experimental Theory of the Steam Engine." The lecturer dealt in detail with the history of Hirn's experiments in the science of thermodynamics, the establishment of which, he considered, constituted more than any other, the greatest achievement in the domain of physical science. Amongst those who took a foremost place in the researches and investigations which established the new doctrine, there were two whose careers had many points of resemblance. Joule in this country, and Hirn in Alsace, had been drawn to the study of the same problems at the same time. Both were concerned in the production of motive power by heat, and its dissipation by friction, and both had been led on from elementary investigation to the study of some of the most recondite problems of physical science. Such lives demanded patience, laborious industry and conquest over many difficulties, and few events marked their career except the publication of their researches. It was well, the Professor concluded, that now and then on such anniversaries as the present to remember them; to make an effort to give them their place; to bear a grateful tribute to the service they rendered. Amongst the audience were representatives of the chief industries of the district, and apologies for absence were intimated from Sir William Arrol, Professor Barr, Professor Jamieson, Messrs. John Inglis, George Russell, and Sydney Cooper, Glasgow, and W. J. Miller and J. Denny, Dumbarton.

It seems remarkable that the Fairfield Co.'s second torpedo-boat destroyer, *Hart*, should on her official steaming trials attain practically the same speed as the boat first completed, the *Handy*. The difference in favour of the second boat is only 70 yards an hour, the first boat having made 27.04, and the second 27.075 knots. The difference is really due to the regulation of the speed in the engine-room. The first vessel was put through a series of progressive speed trials by Mr. Laing, the maximum speed got being over 28 knots; and it was then ascertained what number of revolutions would give the guaranteed speed, and this was as closely adhered to as possible. The results were specially needed in view of the building of 30-knot boats. The *Hart*'s machinery developed 4,143 I.H.P., so that the speed was got with moderate driving. The boilers were subjected to a pretty severe forced blast, the pressure in the stokehold, according to water gauge, having been 2½ in., but no difficulty was experienced with the boilers, which are of the Thornycroft water-tube type. The steam was at 196 lbs. pressure. The *Hart* will now be prepared for an exhaustive series of trials with oil fuel.

The shareholders of Messrs. W. B. Thomson & Co., Limited, shipbuilders and engineers, Dundee, held a meeting in the early part of the month to consider the question of having the company wound up. Mr. Henry McGrady presided, and intimated that it was the desire of the directors that the company should be wound up voluntarily. During the past year or two the company has carried through very little work, and at the present moment the shipbuilding yard is absolutely bare. It was pointed out that the company were indebted to the Commercial Bank of Scotland to the extent of £7,000, and that the Bank had threatened to appoint a liquidator. Such a course would involve a good deal of expense, and it had therefore been suggested that the call of £1 per share recently made on the shareholders should be utilized in paying off the Bank. £8,000 in all had been thus realised, and it was decided to wind the company up

voluntarily, and that the money raised by the call should be utilized for the payment of the Bank's claim.

The Institution of Engineers and Shipbuilders in Scotland held their annual dinner on the night of the 18th ult., in the Windsor Hotel, Glasgow. The President of the Institution—Sir William Arrol—occupied the chair, and Professor Andrew Jamieson and Mr. Henry A. Mavor acted as croupiers. Over 200 guests were present, among whom were the following:—The Right Hon. Lord Blythwood, the Very Rev. Principal Caird; Mr. J. G. A. Baird, M.P.; Colonel John Scott, C.B.; Sir Andrew MacLean, Sheriff Principal Berry, Lieutenant-Colonel John M. Denny, M.P.; Professor W. Cawthorne Unwin, Mr. John Inglis, Mr. J. G. Dunlop, Mr. Richard Barrowell, Major the Hon. J. S. Napier, Mr. Robert Caird, Mr. George Weir, Mr. Thomas B. Seath, Mr. Wm. Morrison, Mr. James Weir, Mr. David Rowan, jun.; Mr. Charles Connell, Mr. G. L. Watson, Mr. John Ward, Mr. John W. Shepherd, Mr. G. S. Goodwin, Mr. D. J. Dunlop, Mr. John Henderson, Mr. Charles A. Knight, Mr. Archd. Denny, Mr. James Rowan, Mr. K. S. Biggart, Mr. Joseph Beardmore, Mr. J. M'L. Blair, Lieut.-Colonel H. D. Robinson, Mr. Edmund Shearer, Mr. James Denny, Mr. J. H. Hutchison, Mr. John Duncan, Mr. W. J. Millar, Mr. A. E. Stephen, and Mr. W. A. Young.

After an excellent dinner the usual loyal toasts were cordially pledged. The toast of the evening—"The Institution of Engineers and Shipbuilders of Scotland"—was given by Professor Wm. Cawthorne Unwin. In the course of his remarks he asked if they had ever thought, within what a short period of the history of the world the whole modern history of engineering and shipbuilding was comprised. He remembered hearing from a friend who was present at the first visit of the Queen to Scotland, that she came to Granton in a sailing vessel towed by a steamer. He also recalled an occasion on which the chairman of the Peninsular and Oriental Co. staked his reputation on the assertion that there would never be an iron ship in the service of the P. and O. Co. Sir William Arrol, in replying to the toast, said that the engineers and shipbuilders on the Clyde had made as much progress as any other industry in this country during the last fifty years. He could recall the progress of their industry 45 years, and he thought the Clyde had its fair share. When that progress was going to stop, no one could tell. Perhaps some had begun to think it was too great. The great change in the steel industry was altering the nature of their employment, and the only way to find employment for the great masses of the working people was to face the keen competition which entered into every phase of life. They had now to face the competition of the whole world, and unless they had freedom to manage their own businesses, the business would assuredly go down, in the same way as the cotton industry had done. He hoped they had grit enough on the Clyde to insist upon keeping the management of their own businesses; it was the only way they could exist and give labour to the working classes. After a considerable number of interesting addresses had been made, Professor Jamieson proposed the "Engineering and Shipbuilding Interests." In his remarks he made allusion to the general increase in the engineering and shipbuilding trade during the past year, and the good prospects held forth for the present one. He drew attention to the further tenders now being invited by our Admiralty for ten new cruisers of the *Pelorus* type, of 2,100 tons and 9,000 H.P. each, with the view to strengthening the defences of this country. It is an ill wind that brings no good, and the President of America's bold, but rash speech, the Kaiser's inconsiderate telegram, together with Jameson's filibustering raid, and the Sultan of Turkey's pig-headed obstinacy, have all, more or less, tended to the engineering and shipbuilding interests of this country, and, as is quite probable, the Clyde in particular.

A noteworthy circumstance in connection with the dinner was the absence of any toast to the memory of James Watt, the eminent engineer. Not only so, but even the speakers, with one exception, seemed to hesitate about so much as mentioning the name of Watt. For many years a Watt anniversary banquet was held in Glasgow, originating about half a century ago with the former engineers. It fell into the hands of the Philosophical Society, and ultimately into the hands of the institution above mentioned. At all these gatherings it was a custom to pledge a toast to the "Immortal Memory" of the great engineer, and to pay a fitting tribute to his indubitable genius. Some of the speeches delivered on such occasions may have degenerated into "an indigestible hash of scraps from a biographical dictionary," but it is easy enough to recall others which partook of a very

different character. The fiat, however, appears to have gone forth, that all eulogiums, good or bad, must now cease. Mr. John Inglis set the example a year ago by refusing to make any attempt to remind his fellow-shipbuilders and engineers of what it is impossible for them to forget. He found it difficult to become eloquent over a "parallel motion" or the "separate condenser" or to arouse enthusiasm about the "steam jacket"; and so he advised that future chairmen of the Institution should be relieved of any such burden. His advice has been followed perhaps more strictly than he intended. The incident raises the question as to whether there is to be in the future no public recognition in Glasgow of Watt and his remarkable achievements. Should the memory of one of the greatest inventors continue to be placed under a ban by the Institution, the probabilities are that a reaction may set in and that other means will be taken for recognising in some suitable and regular manner the debt of gratitude we owe to his labours. In this connection Glasgow might learn a lesson from Greenock. Once every twelve months the Philosophical Society of Greenock calls to the birthplace of Watt some eminent expert who discourses on topics associated with the applications of steam to industrial pursuits. If the Institution of Engineers and Shipbuilders do not see their way to adopt a similar plan, it may be taken for granted that others will occupy the ground.

Messrs. Mackay & Baxter, engineers and boiler-makers, Glasgow, were granted lining, at the Govan Dean of Guild Court, held about mid-month, to erect buildings on the north-east side of Copeland Road, Govan. The buildings—works and offices—will cover ground 100 ft. by 56 ft. and will be used for the business of engineering, boiler-making, and steam launch building.

Messrs. Simons & Co., Renfrew, contracted with the Wexford Harbour Commissioners late in the month to build a steam-dredger at a cost of £7,000 and contingencies.

Messrs. Marshall & Co., Kelvin Dock, Maryhill, contracted early in the month to build a screw steamer of about 80 tons for canal and coasting traffic. Compound surface-condensing engines will be supplied by Messrs. Campbell & Calderwood, engineers, Paisley.

Several changes in the firms of Messrs. William Denny & Bros., shipbuilders, and Messrs. Denny & Co., engineers, Dumbarton, have occurred since writing last month's Notes. Mr. Leslie Denny, youngest son of the late Dr. Denny, and Mr. Henry William Brook, son of Mr. Walter Brook, Levenford, have been admitted partners of Messrs. William Denny & Bros.; and Colonel Denny, M.P., Mr. Archibald Denny, and Mr. John Ward, all partners of Messrs. William Denny & Bros., have also been assumed as partners of Messrs. Denny & Co., engineers. The partnership changes have been brought about through the death of Dr. Denny, who was senior partner of both concerns. Messrs. Denny continue to be well employed and have at present on hand a large number of new orders. Early in the month they received orders to build 15 barges for service in Russia—five of which they gave to Messrs. M'Millan & Son of the same port, and later on in the month they received instructions to build other four—two paddle ones for service in India and two flat ones for Russian service.

Messrs. A. M'Millan & Son, Limited, Dumbarton, secured an order in the early portion of the month to build a steel screw steamer of about 1,500 tons, for passenger and cargo trade, for Messrs. Thos. Wilson, Sons & Co., Limited, Hull. Both the vessel and machinery—which will be supplied by Messrs. Muir & Houston—are to be built to the requirements, and to take the classification of the British Corporation Registry. The same firm of builders have also under construction five large barges for service in Russia. Fifteen barges in all were given out to Dumbarton, the other ten going to Messrs. Wm. Denny & Bros. This contract, with the work already on hand, places Dumbarton in a good position.

Messrs. William Hamilton & Co., shipbuilders, Port-Glasgow, at the beginning of the year received an order for a three-masted steel ship. The new vessel, which is for Liverpool owners, will be capable of carrying 3,400 tons deadweight.

Messrs. Robert Duncan & Co., Limited, engineers and shipbuilders, Port-Glasgow, contracted, in the early part of the month, to build a steel twin-screw steamer for passenger traffic at New Zealand. The new vessel will be 120 ft. long; 23 ft. broad; and 8 ft. in depth, moulded. Messrs. Muir & Houston, Glasgow, will supply the engines, which will be of the triple-expansion type.

## TRADE NOTES FROM THE TYNE, WEAR TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

### THE TYNE.

**Shipbuilding.**—Many circumstances point to the conclusion that the trade of the country has at last entered upon the upward grade, and that any change which may take place in the immediate future is likely to be in the direction of greater activity. In the shipbuilding industry the signs of improvement are most marked, and nowhere is the tendency towards greater expansion of business more noticeable than in the district comprising both sides of the Tyne.

An opinion to which we have often given expression is receiving an ample verification at this moment, and that is that the inability of old and badly equipped vessels to compete successfully with the admirably furnished ships of modern construction must necessarily result in the former dropping out of the race. It is this circumstance more than anything else which is accountable for the greater briskness that is now being experienced at most shipbuilding centres, and which is pretty certain to prove an important factor in the further development of the industry. Many of the old vessels that have lately given place to new ones in the fleets of English companies have been broken up, but a much larger number have been sold to foreign owners. It is in every way fitting that England should continue to have the best service in the Mercantile Marine, and there is every reason to hope that the characteristic enterprise of British shipowners will always be equal to the maintenance of this satisfactory position.

So far as the Tyne is concerned the first month of the New Year is marked by an event of considerable significance, namely, the reopening of the Palmer Co.'s yard at Howdon. This has been decided on owing to a large accession of orders, among which the Admiralty orders—first for two, and subsequently for four other torpedo-destroyers—must be given first place. It is understood that the whole of the six torpedo boats will be laid down at the Howdon yard, thus leaving the Jarrow yard—or such portion of it as is at present unoccupied—open for the building of heavier vessels. There are at present five berths occupied at the Jarrow yard, all the vessels being of large size and three in very early stages. The Company have just been commissioned to build for the Hamburg South American line a fourth steamer, similar in all respects to three previously ordered and now in course of construction.

Messrs. Armstrong, Mitchell & Co. have received an order for two battleships for the Norwegian Government, and as they have already in hand several war vessels for other foreign Governments, the company's establishment at Elswick has become extraordinarily busy. There is also a great increase of activity at their Low Walker yard, among the recent orders at the latter establishment being one for a couple of passenger steamers from Finnish owners, and one for a large ferry steamer and an icebreaker, which is understood to be on Russian account. The large German steamer *Herman*, which came into the company's hands some time ago, and has since lain moored beside the yard, has been sold to Italian owners, and will, it is understood, be fitted up as an hospital ship.

Messrs. Hawthorn, Leslie & Co. are carrying out in their graving dock an extensive overhaul on the Norwegian tourist steamer *Midnight Sun*. The vessel suffered great damage through having been ashore at the end of last season, and when floated, was brought to the Clyde for repairs. She was, however, subsequently brought to the Tyne, and docked at Hebburn as stated. The vessel is being most sumptuously re-fitted in the saloons and other parts reserved for the accommodation of passengers, and the machinery is also receiving attention. It is expected that the work of restoration will be completed in time for placing the vessel on the regular service between Newcastle and Bergen, at the opening of the coming tourist season. Five building berths in the yard are now occupied, the vessels on the stocks being three small ones ordered by the Russian Steam Navigation Co., a large vessel of the cargo type for the Volunteer fleet, and a large one for the Colonial meat trade. The last of three torpedo destroyers built by the firm, which is named the *Ranger*, is still lying beside the yard having her equipment completed.

Messrs. Wigham Richardson & Co. have four large vessels on the stocks in various stages of progress, and the keel for another

has just been laid. In the frame-turning department work is very active, and for some time past the deliveries of material have been very heavy.

Messrs. C. S. Swan and Hunter continue to be well-supplied with work, and although there are now one or two berths vacant in the yard, it is expected that they will very soon be filled up. At Messrs. Dobson & Co.'s yard the construction of a vessel on which work had been temporarily discontinued has been resumed, and an appearance of greater briskness is shown throughout the various departments of the establishment.

The Tyne Shipbuilding Co. have three large vessels on the stocks, one of which is ready for launching. At Messrs. Readhead's yard the customary activity is maintained in both the building and repairing departments, and it is understood that some additional orders have been booked this month. Messrs. R. Stephenson & Co. have no ships building, but a limited amount of dock and harbour work serves to keep a portion of the hands employed.

Messrs. Edwards' yard, Howdon, and Messrs. Schlesinger and Davis' yard, Wallsend, are still inoperative. With regard to the latter, a rumour as to reopening was current lately, but it is now known that nothing in this direction is likely to be done just yet. The letting of the establishment has been placed in the hands of Mr. John McKenzie, late of the Sootwood yard, and it is by no means improbable that through this gentleman's agency a tenant or purchaser may soon be found. The yard has a full equipment of machinery and plant, and is in all other respects admirably adapted for the carrying on of a successful business.

**Engineering.**—The overtime question in the engineering trade is again beginning to cause anxiety. Consequent on the Stockton men refusing some months ago to be bound by the agreement which was entered into at the close of 1891, the employers gave the necessary month's notice of withdrawal from the agreement early in December last, with the result that they began the present year's operations free from all pledges regarding the restriction of overtime. This, it is needless to say, is as it should be, for in regard to working overtime, restrictions are not only unnecessary, but highly objectionable. The extra rate paid for overtime is the only check needed to prevent its excessive use. The operatives—following the example of the masters—are now withdrawing from the agreement, several branches have already held meetings at which the decision to withdraw was arrived at. There was really no need for this, as the withdrawal of one of the parties to it was quite sufficient to cancel the agreement. The latter is indeed best out of the way; yet its absence gives rise to uneasiness, as it is recognised that a conflict may take place at any time by the refusal of the men to work overtime when, in certain cases, the employers may require them to do so. For the sake of all interests it is to be hoped that the employers will not allow themselves again to be tempted into agreements for restriction, for the first essential to prosperity is absolute freedom of action, in so far as all events as the method of carrying on one's business is concerned.

The Wallsend Slipway and Engineering Co. have booked some good orders lately, among them being one for the exceptionally powerful machinery required to be fitted in the Pacific Steam Navigation Co.'s large steamer now building at the yard of Messrs. C. S. Swan & Hunter. The complement of hands in each department has been increased since the opening of the year and it is expected that a still further augmentation will be made shortly.

The North Eastern Engineering Co., Limited, are converting, at their Wallsend works, the machinery of the s.s. *Glencoil* from the compound to the triple-expansion type, and are also supplying new boilers. They have some other contracts of a similar kind to proceed with (one from Messrs. Hunting & Son, Newcastle), besides machinery and boilers for new vessels.

The Neptune Engine Works, Low Walker, are pretty busy just now, and at the St. Peter's works the activity is quite exceptional. At Messrs. R. Stephenson & Co.'s works, South Street, Newcastle, there is a little doing in the way of marine work: but the manufacture of the firm's patent oil engine together with the work in the locomotive department, is giving employment to a good many hands. Two ventilating engines of a novel type have recently been delivered from the works to H.M.S. *Inferible*, and it is confidently believed that they will be found, when in actual work, to be an improvement upon other types now in use. We hope, in a future number, to be able to give more definite particulars of this interesting speciality.

Messrs. William Hindson & Co., Gateshead, having provided themselves with special machinery and accessories adapted to

facilitate steamship and engine repairs, have begun to do a steady business in this line, and have already secured several important time contracts from local steamship companies. In the smiths' shops business is also brisk, there being a good many orders in hand for the "improved Martin's anchor."

The order for 12 crank shafts for the torpedo destroyers about to be built by the Palmer Co. has been given to Messrs. Charles Cammell & Co., of Sheffield, whose representative in this district is Mr. George Noble, consulting engineer, 7, Dean Street. Mr. Noble, who is also the local agent for Messrs. Stone & Co., of London, has secured for the latter firm an order for a bronze propeller, to be fitted to the s.s. *Alcoa*, just launched by Messrs. Doxford, Sunderland, and which is said to be the largest cargo steamer afloat.

Messrs. Donkin & Co., of the St. Andrews' Engine Works, experienced a good demand throughout the whole of last year for most of the specialities manufactured by them, which include vertical and horizontal steering gears, ash hoisting engines, blowing and exhausting fans, workshop engines for battleships, &c.; and as they have already booked a considerable number of orders for the present year, and enquiries are still numerous, there is every reason to expect a continuance of the satisfactory condition mentioned.

Messrs. Proctor & Son, Side, Newcastle, the well-known manufacturers of ventilators, lamps, and other steamship accessories, are just now unusually busy, a considerable accession of work having come to them since the opening of the year.

Mr. W. F. Snowdon, manufacturer of non-conducting compositions for covering boilers, steam joints, &c., has just now on hand contracts on three Russian passenger steamers at Hebburn, and on other large vessels at Wallsend, Hartlepool, &c. Mr. Snowdon, who is the local agent for the sale of Morison's evaporator, has been very successful with this speciality lately, and is now receiving many inquiries in reference to it.

The proprietors and manufacturers of the Zynkara Composition for preventing corrosion in steam boilers, are experiencing a large and steadily increasing demand for their speciality, which is undoubtedly gaining in popularity as it becomes better known.

**Electric Lighting.**—Messrs. J. H. Holmes & Co. are still very busy with ship-lighting contracts, at Hebburn, Middlesbro', Stockton, and on the Clyde. They have also in hand an important land installation at Sunderland (the equipment of a central station for town lighting), and they have just contracted for the sending out and erecting of a similar plant (for a like purpose), at Perth, Western Australia.

**Blyth.**—The coal trade at this port has shown a slight falling off in 1895, the total shipment for the year being 2,485,166 tons, as against 2,672,418 in 1894. At present the staiths are not so fully employed as they were a few months ago, and many of the neighbouring collieries are only working from six to nine days per fortnight.

In shipbuilding there is but little doing, the Blyth Shipbuilding Co. having only one large vessel on the stocks. The company have in addition, however, two vessels in their graving docks, and are fitting a new boiler in the s.s. *Rantzani*, which is moored at the Quay. They are also overhauling and altering a large Liverpool steamer, which is intended for employment in the fruit trade. The Blyth Dry Dock Co. have a vessel in their graving dock undergoing some necessary repairs. The new coal staiths at the North side are expected to be ready for work in May.

#### THE WEAR.

**Shipbuilding.**—The event of the month has been the launch of the s.s. *Alcoa*, built by Messrs. Doxford for Messrs. Rudolph Crow & Co., Liverpool. The size of the vessel may be estimated by the fact that she is capable of carrying over 11,000 tons of cargo, and it is not surprising that when she got off the "ways," the displacement of water was so great as to cause some untoward accidents, which, however, did not result in serious injury to any one. The vessel being "joggle" plated throughout, has quite a unique appearance, and when this new system of plating is carried out on so extensive an area of framing, it goes without saying that its admirable characteristics are all the more conspicuously shown. The firm have several other good sized vessels in progress, and are likely to have a very large output this year.

Messrs. J. L. Thompson & Sons have also launched a vessel of exceptionally large size this month, and having another of equal dimensions to launch shortly, are also beginning the year well so far as the prospective output is concerned. These two vessels are for the Rickmers & Co., of Bremen, and each will have

a carrying capacity of considerably over 7,000 tons. The firm have a large amount of other work in hand, and frame-turning is proceeding briskly.

Messrs. Blumer & Co. have sold one of the vessels that have stood for some time in a partially constructed state on the stocks, and it is stated that a large vessel building at Mr. Laing's yard has also been disposed of. At Messrs. Short Bros., and at Messrs. Priestman & Co.'s yard, work continues plentiful, but the other establishments on the river are only indifferently employed.

**Engineering.**—Messrs. Doxford are engining at their shearlegs the large steamer *Alcoa*, and at the Southwick Engine Works a vessel recently launched from the North Sands yard is receiving her machinery. At the Palmer's Hill Works (Messrs. John Dickinson & Sons, Limited), there is a fair amount of work in progress, among the orders in hand being one for a very large set of engines for a vessel now building on the Wear.

A remarkable feat in the way of quick despatch has just been performed at the Sunderland Forge, Pallion. On January 13th there was sent away from the works a large stern and rudder frame, ordered by a Spanish firm, the work of which was begun and completed within eight working days. The work was begun before the holiday period was quite over, a circumstance which makes its completion in so short a time all the more creditable. The establishment is just now well provided with work, and there is reason to expect that this satisfactory state of matters will be maintained throughout the year.

The works of Mr. A. A. Rickaby are kept pretty busy on orders for piston-rod packing and other specialities, and at the Monkwearmouth Iron Works business continues tolerably active. The Monk Street Foundry and brass works are well supplied with orders and at some of the other local foundries business is improving.

**The Hartlepoons.**—The fact that Messrs. Sir W. Gray & Co. have again headed the list in the output returns of shipping for 1895, should be matter for congratulation among the inhabitants of the Hartlepoons, and it is satisfactory to find from the work now on the stocks and in preparation, that the promise of another good year is assured. At the engineering establishments the outlook for the immediate future is also satisfactory, and it is believed that the local steel works will be kept in steady operation throughout the year. At the docks business is just now somewhat dull, coal shipments being limited in quantity, and timber imports having largely fallen off.

**Stockton.**—That the year 1895 has not been a particularly bad one at Stockport is shown by the large output by one of the large shipbuilding firms, Messrs. R. Roper & Sons, which reached the creditable figure of 46,000 tons. This enterprising firm have at present a fair share of work in hand, a statement which also applies to the other local establishments. The engine works of Messrs. Blair & Co. continue well employed, and boiler-making works are kept busy. Steel works are well supplied with orders, and both forges and bridge works are doing a tolerably satisfactory trade.

**Middlesbro'.**—Messrs. Raylton Dixon & Co. have a good show of work in their yard, two of the vessels on the stocks being for the Hansa Co., of Bremen, to whose order the firm have already supplied six vessels, having an aggregate deadweight capacity of over 20,000 tons. Steel works are becoming decidedly busier, and prices of material have further advanced.

**Consett.**—The works of the Consett Iron Co. are now exceptionally busy, the demand for steel ships and boiler plates being much better than at any period of last year.

#### THE MERSEY.

(From our own Correspondent.)

A PART from the general satisfaction which prevails that the long protracted dispute on the Clyde and at Belfast is now at an end, there is no particularly new feature to report with regard to the shipbuilding industry in this immediate district. As reported last month, a good deal of marine engineering work at various shops in this neighbourhood has been held in abeyance for the last month or so, pending the settlement of the above dispute, which will now be proceeded with, and a good many further orders which are almost certain immediately, but which have been held in suspense



of the backward condition of the ships in hand owing to the strike. Only last week, going through the works of Messrs. J. P. Hall & Co., of Oldham, we noticed several sets of specially designed combined engines and dynamos for ship lighting purposes, and which were completed and ready for handing over, but the deliveries of which had been stopped owing to the strike. It may be added that these engines and dynamos are of an improved design, and in our next issue we expect to be able to give illustrations and some detailed description. Messrs. Laird Bros., on the Birkenhead side of the Mersey, report nothing new of any special interest just at present; but they are kept very busy upon work in hand, which includes a large number of the high-speed torpedo catchers, the completion of which is being hurried on by the Government. Satisfactory progress is also being made with other work in hand to which reference has previously been made.

Reports have been circulating on the Manchester Royal Exchange, and from apparently well-informed quarters, which, if true, indicate the probability of an important development of the shipbuilding industry on the Liverpool side of the Mersey. The substance of these reports is that Messrs. Harland & Wolff, the well-known Belfast shipbuilders, are contemplating the establishment of an extensive shipyard on the banks of the Mersey, in the vicinity of Liverpool, and that the land requisite for the purpose has actually been taken. It is further stated that one of the principal reasons for the above course of action on the part of Messrs. Harland & Wolff is, that for a number of years serious complaints have been raised as to the inconvenience to engineers with regard to work on vessels put into the above port for repairs. In the case of vessels putting into Liverpool, application has to be made to the Mersey Dock and Harbour Board for a dock, and it is not infrequently the case that the dock to which the vessel is assigned by the Board is miles away from the engineering shops of the firm who may have the repairs in hand. The particular dock to which the vessel may be sent is, of course, altogether in the discretion of the Board, and regulated according to their convenience. Under these circumstances the erection of a ship-yard with repairing docks of its own will obviously be a great advantage to the port, and Messrs. Harland & Wolff's action may give a very welcome stimulus to the Liverpool shipbuilding industry, which, as is well known, has for several years past been gradually dwindling into insignificance.

The increasing use of metals of high tensile strength in engineering work, especially for marine purposes, has induced the United Alkali Co., who are large producers of copper, to make a number of experiments with a view of satisfying requirements in the above direction, and they have now been successful in producing manganese alloys of high tensile strength, hardness and ductility, combined with high resistance to corrosion by chemicals. The company has also gone into the question of amalgamating other metals, with a view of reducing friction and wear and tear of machinery, and have now produced alloys answering the above purpose.

The returns issued during the past month by the principal trades union societies connected with the engineering industries, show no material change in the number of out-of-work members on the books. The Amalgamated Society of Engineers have had about 8 per cent. of its total membership on donation benefit, but about half of this has been due to the shipbuilding dispute at Belfast and on the Clyde, but, despite the unsettlement produced by the above cause, the unemployed list is considerably less than it was in January, 1894. In those centres not affected by the dispute the number of the out-of-work members shows, if anything, a slight decrease on that of the previous month. In this immediate district, the unemployed list has fallen to about 4 per cent. of the local membership, whilst increased activity is reported in branches which have recently been but indifferently employed, and the demand for pattern-makers and smiths has during the month been so pressing that the local secretary finds a difficulty in coping with it. The returns of the Steam Engine Makers' Society were made up before the men had fairly got into work again after the holidays, and no precise estimate of the number of unemployed members can be given, but it is expected that this has now got down to the level at which it stood prior to the holidays. The reports received from the various districts as to the state of trade are of a very encouraging character, establishments generally being well engaged. In marine centres a slight improvement is here and there reported—a special feature being the increased activity at the Government Dockyards.

There has been considerable friction for a long time past between the masters and the men in the Bolton engineering trades, with regard to the overtime question, the men having, it is reported, threatened to refuse altogether to work overtime unless some satisfactory understanding could be come to with the masters. A number of conferences between representatives of the employers and the men have been held, with a view of settling not only this, but other minor questions which have from time to time arisen. These conferences have at length resulted in an amicable arrangement being come to, which provides that, except as regards breakdown work or repairs, where, on new work only, any workman has made in four successive weeks more than 10 hours actual overtime per week, or more than 40 in the aggregate, he shall not be called upon to work for the ensuing two months more than 10 hours actual overtime in any one week. Other questions were also discussed, and upon one matter in which some of the machine fitters and turners are rated under the standard rate, the masters conceded they were entitled to an advance, and they also admitted the application of the smiths' strikers to be rated for all-night work the same as the smiths, viz., time and a half.

The engineering trades of the district continue in a satisfactory position, with a hopeful outlook for the future. Generally establishments re-started work after the holidays well supplied with orders, and new work has been coming forward steadily. Machine tool makers are securing a large weight of orders, and stationary engine builders continue well off for work, whilst boiler-makers report a steady improvement as regards orders coming forward, and the locomotive building industries are getting into a much better condition than they have been for some time past.

In the iron trade the gloomy outlook as regards both home and foreign affairs, at the commencement of the year, tended to give a depressed tone to the market, with a consequent curtailment of business, and an easing tendency in prices, although the only appreciable reduction was in outside brands of pig-iron, which were affected by the fall in warrants. With the close of the month, however, the market has entirely recovered from the depression which characterised the opening, and prices have regained their firmness, outside brands being now quite 1s. per ton above the low figures taken during the earlier part of the month, whilst there is a general hopeful outlook as to the future. In pig-iron a moderate business is reported, with prices now firm at makers' quoted rates. Local makers still quote about 46s. less 2½ for No. 3 foundry; with Derbyshire foundry, which had eased down somewhat, now averaging 46s. to 47s. net cash; and Lincolnshire 41s. 6d. and 42s. to 43s. 6d. and 44s. 6d. for forge and foundry, net cash, delivered Manchester. For outside brands, prices, as above reported, have been irregular, but the minimum for foundry Middlesbrough is now about 45s. 10d. to 46s. 4d. net cash, delivered Manchester, with Eglington about 47s. 8d. to 47s. 6d. net cash, delivered Lancashire ports.

In finished iron makers generally have been securing new work in sufficient quantity to keep them fully going, especially in bars, for which they are firm at £5 10s. for Lancashire, and £5 10s. to £5 15s. for North Staffordshire qualities. Sheets are not so strong as they were owing to a falling off in the weight of business doing, and £7 10s. is now the average figure obtainable, but enquiries are again beginning to come forward more freely. Hoops are in extremely slow request, but Association list rates remain at £6 2s. 6d. for random to £6 7s. 6d. for special out lengths, delivered Manchester district, and 2s. 6d. less for shipment.

The steel trade has been only quiet, but hematites show a stiffening tendency, 56s. less 2½ being now the minimum for ordinary foundry qualities, with 1s. more quoted for some special brands. Steel boiler plates, notwithstanding the settlement of the shipbuilding dispute, are still obtainable at £6 5s. for immediate delivery in this district, but there would no doubt be an upward move immediately a settlement took place.

In the metal market business was very slow during the first part of the month, and prices were reduced ¼d. per lb., except in yellow metal plates, but there is now a fair business doing, especially in tubes, although there is scarcely so much activity in rolled metals as recently. Enquiries for all descriptions of fittings in connection with locomotive building are increasing, and a few moderate orders have been placed with others in prospect. List rates are firm at the reduced quotations, and the improvement in copper tends to harden the market, so that any further change will probably be in an upward rather than

a downward direction. List rates, delivered Manchester district, are now as under:—Solid drawn brass boiler tubes, 6d. solid drawn brass surface-condenser tubes, 7½d.; solid drawn copper tubes, 7½d.; brazed copper gas and steam tube, 7d.; brazed brass gas tube, 8½d.; brass wire, 5½d.; copper wire, 6½d.; rolled brass, 5d. per lb.

Business in the timber trade has been quiet, but prices continue steady. Imports have been only moderate and with deliveries fair, stocks generally are not excessive. East India teak is unchanged in price, although cargoes have been offering at lower rates; stocks are ample. One cargo of greenheart has arrived, and with a tolerable demand, stocks are only moderate.

The coal trade has shown little or no improvement, either as regards prices or demand, and although pits were, in most cases, closed longer than usual for the New Year holidays, there was no push of orders at the re-start, and, in many instances, the collieries are not now kept going more than four to five days per week. Housefire coals are perhaps in rather more active request, but there is not that pressure of orders usually expected at this time of the year, and with supplies plentiful prices are not more than maintained at 10s. to 10s. 6d. for best house coal; 9s. to 9s. 6d. for seconds; and 7s. to 7s. 6d. for common qualities, at the pit-mouth. Steam and forge coal are meeting with but a slow sale, and supplies are excessive, with prices consequently weak, averaging not more than 6s. per ton at the pit-mouth. Engine fuel moves off moderately at about late rates, common slack remaining at 8s. to 8s. 6d.; and better qualities 4s. 6d. to 5s. at the pit-mouth.

Only a very limited business has been put through for shipment, with no improvement in prices, ordinary steam coal not averaging more than 7s. to 7s. 6d., delivered ports on the Mersey.

## BELFAST TRADE NOTES.

(From our own Correspondent.)

WORK was resumed generally in the Belfast shipyards on Monday, January 6th, after a fortnight's cessation. During the holidays, Messrs. Harland & Wolff decided to put their yard on short time, as the shipbuilding department is already far in advance of the machinery section, on account of the engineers' strike, which unfortunately still prevails. A more hopeful feeling now exists, however, with regard to it. As mentioned in last month's Notes, the Glasgow conference proved abortive, but Lord James renewed his endeavours to bring about an end to such a disastrous state of affairs, with the result that another meeting has been held at Carlisle on the 16th inst. The Representatives of the A.S.E. present were Mr. Sellicks, president, Mr. Anderson, secretary, and Messrs. Ferguson & Rose, organising delegates, the latter being from Belfast; while the masters were represented by a committee, of whom Messrs. Clark & Wilson were from this centre. The two parties did not meet face to face, but negotiations were carried on through Lord James, to whom great praise is due for the untiring activity he has displayed since taking this matter up. As both sides seemed more or less tired of the present state of affairs, little difficulty was experienced in drawing up an agreement whereby the Clyde men were to receive a minimum wage of 7½d. per hour, and the Belfast men 1s. advance, that is 38s. per week, immediately. These terms were submitted to the men on Saturday, 18th current, simultaneously in Belfast, Glasgow, and Greenock, with the result that Glasgow and Greenock accepted them, but Belfast, by a very large majority, refused them. The figures were as follows:—

### ENGINEERS.

For the masters' proposal	...	...	...	...	127
Against	...	...	...	...	578

### BRASSFOUNDERS.

For the masters' proposal	...	...	...	...	20
Against	...	...	...	...	66

### MACHINE-MEN.

For the masters' proposal	...	...	...	...	3
Against	...	...	...	...	39

Majority against 583

The following are the figures for the various districts:—

	For Employers' offer.	Against Employers' offer.
Glasgow & Clydebank	... 1,297	430
Greenock	... 432	35
Belfast	... 150	683
	1,879	1,148

Matters were apparently as bad as ever, as one district could not resume work without the other, but happily the executive of the A.S.E. decided to bring pressure to bear upon the Belfast engineers and thus compel them to accept the terms. This has accordingly been done, and as we write it is confidently expected that all the men will be at work on Monday, 27th January, or during the following week. The trouble does not appear to be entirely overcome yet, however, as an intensely bitter feeling exists among the engineers here. They consider they have been very hardly treated, as, by the latest concession, the Clyde men get an immediate advance of 2s. 3d. per week, while the Belfast men have to be content with only half their original demand of 2s. without a definite promise of the other shilling. Another aggregate meeting is to be held to arrive at a final conclusion. It is to be sincerely hoped that this month will see the strike ended, as, although the engineers themselves could perhaps hold out for an indefinite period, the distress and privation amongst the labouring classes thrown idle on account of it has become most intense, and besides working short time the yards are only employing about half the usual number of men.

It is expected that the moulders' demands will be conceded by the remainder of the firms still standing out. About 130 men are already working at the 2s. advance asked for.

There are no launches to mention up to the present this month, although the s.s. *Langton Grange*, for Messrs. Houlder Bros., London, has been ready for launching in the South yard of Messrs. Workman, Clark & Co. since the middle of December. The shipyard work has been proceeded with on her, and she will be in an advanced state when she takes the water.

The s.s. *Historian*, for Messrs. T. & J. Harrison, of Liverpool, is in the Abercorn Basin receiving the finishing touches preparatory to leaving here on Wednesday, 29th inst. for Liverpool, from whence she will shortly sail for Galveston to load cotton.

The White Star steamer *Doric* has had her repairs completed in Liverpool, and started in the middle of the month on a voyage unique in the annals of steamship running. She takes a cargo direct from Liverpool to San Francisco, a voyage of 13,500 miles, without a break. Her route will be by the Straits of Magellan, and on arrival she will take up her station along with her sister ships *Belgic*, *Coptic* and *Gaelic* in the trans-Pacific service of the Occidental and Oriental Steamship Co. between San Francisco, Honolulu and Hong-Kong.

Work proceeds but slowly on the other steamers finishing by Messrs. Harland & Wolff.

The China Mutual Steamship Navigation Co.'s s.s. *Hyson* is still in the hands of her builders, Messrs. Workman, Clark & Co., but possibly she may be got away in the latter end of next month should the engineers resume work immediately.

The Union Co.'s twin-screw steamer *Scot* is expected here shortly from Vigo, into which port she put, after abandoning her voyage to the Cape, to undergo alterations and repairs at the hands of Messrs. Harland & Wolff. Her cargo carrying capacity is to be increased as much as possible, but it is stated that the engines and boilers are not to be interfered with. Repairs are also being effected here to a small Liverpool steamer named the *Electra*. This vessel left Belfast on a voyage to Swansea, but had to be towed back the same day to the Lough, having lost her propeller and part of her tail shaft. These are being replaced by a local firm.

A rather interesting case has also come under notice here. The s.s. *Glenarm*, owned by the Antrim Iron Ore Co., Limited, while on a voyage with a cargo of copper ore, went ashore on the Scotch coast and was about five days partly full of water. After being got off, she was brought to Belfast for an overhaul, when it was found that the action of the sea water had set up a fierce galvanic action, and at present it is under consideration, seeing the damaged state of her engines and boilers, due to the aforementioned cause, whether she will be worth repairing. She has been examined by various experts, who found severe pitting in various parts of the machinery, notably in the feed-pipe, parts of which present the appearance of brown paper, while her boiler

tubes are covered with a heavy deposit of pure copper. The main shafting is also severely pitted in many places.

As will be seen from the shipbuilding returns of the United Kingdom, published last month, Belfast occupies a prominent position on the list. Messrs. Harland & Wolff, although, not like last year, in the premier position, have still a very creditable total, while Messrs. Workman, Clarke & Co. occupy fourth place, with a remarkable output considering the size of their works.

A noteworthy fact is, that all the vessels built during 1895 by Messrs. Harland & Wolff were registered at Liverpool.

It is reported that several large orders have been placed with Belfast builders, and it is expected that, with the end of the engineers' strike, an era of brisk trade will commence which will do much to dispel the evil effects which otherwise would be severely felt for a prolonged period.

## NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

**Barrow-in-Furness.**—There has been considerable activity in shipbuilding trade at Barrow during the past month. Of course the usual holidays intervened, and as a large number of Scotsmen are now employed at Barrow, it was necessary to give them the usual fortnight's leave to spend their Hogmanay on the Clyde and elsewhere, but a resumption of work was effected on the 7th of January, and since our last report very much progress has been made on the work in hand. This is especially the fact in the case of H.M.S. *Powerful*, which is rapidly approaching completion. A vast army of men is working on this ship, and it is expected she will be delivered to the Admiralty by midsummer. It will be a feather in the cap of Barrow to build a vessel of such gigantic dimensions, the first of its type ever constructed in the yard, in the space of 2½ years, and especially considering that a new type of boiler has been adopted. Considerable activity has also been shown in the case of H.M.S. *Juno*, launched last year. She has already her boilers on board, and her engines are ready for her. She will be delivered soon after June, and her sister ship the *Doris*, which is to be launched on the 3rd of March—the christening ceremony to be performed by the Hon. Miss Hood—will, it is expected, be delivered by August or September. In the meantime much attention is being given to the preliminary work of building H.M.S. *Niobe*, a first class cruiser not much less than the *Powerful*, and to the two 30-knot torpedo-boat destroyers for the Admiralty. The Barrow Co. is one of the firms that has been asked to tender for two third-class cruisers of the improved *Bellona* and *Barham* type, and it is thought probable the order for some of these vessels will be placed at Barrow, and the hope is entertained that in the new naval programme, Barrow will be one of the yards to which the order will be given for a new battleship. There is every facility for the building of such a ship at Barrow, good hard ground, safe launching area, and all the necessary capacity for turning out a first-class job. Apart from English work it is known that important orders are likely to come out for the Japanese and Chinese navies, and Barrow will endeavour to secure a share of this work. Year by year the Barrow yard has become more and more an Admiralty workshop, as there has not been much commercial work in progress, and as experience has been gained, better opportunities are afforded of successfully tendering for any new work on offer. There is, however, good prospects of a deal of first-class commercial work during 1896, and some of that is already the subject of local negotiation. During the month the only order received by the Barrow Co. was one to triple the s.s. *Clan Sinclair*, from Messrs. Cayzer, Irvine & Co. Eight or nine of these tripling jobs have been done at Barrow for the Clan Line and all the modernised ships have turned out successful. It is believed by those who are watching the signs of the times that a return to brisk trade in 1896 will result in one of two things, either in the breaking up of obsolete tonnage or in tripling and re-boiling of several steamers yet fit for service. This should prove a very fruitful source of work in the present year. The s.s. *Clan Menzies*, of 4,000 tons, for the Clan Line will be launched at Barrow on February 1st, and the s.s. *Clan Lindsay* will be launched about six weeks afterwards. These two ships are the only commercial orders now in hand. The trials of the s.s. *G. B. Crow*, the sand pump dredger, on the Mersey, have proved highly successful, and it is shown that she will be a great help in deepening the approaches

to the Mersey and in keeping a clear passage to and from the sea at all states of the tide.

On the 10th of January the annual re-union of the staff and officials of the Naval Construction and Armaments Co. was held in the Drill Hall, Barrow. In previous years a dinner has been given by the company, but this year Mr. A. Adamson, J.P., the managing director, determined to make the affair a more comprehensive one, and to enable the officials and staff to bring with them their wives and sweethearts, gave a soirée, concert and ball, which proved to be a highly successful reunion. Mr. Adamson presided at the concert, and said: The year that had gone had been a hard one, but the one on which they had just commenced would be a very much harder one. He did not object to hard work himself, and he liked to see everybody about him busy, and so far as they were concerned at present, even if they got no more work, they had plenty in hand not only for this year but for the year that would follow it. Before leaving his office that night he looked into the amount of work they had in hand and was somewhat surprised at the total. The tonnage they had at present at the Naval Construction and Armaments Co. was about 43,000 tons, and the H.P. for the engines to drive the vessels represented about double that, being somewhere about 80,000 I.H.P. The value of the work came up to about £1,750,000. That, as they would see, was a very large amount of work. Some of it was partly done, as they were aware, and the work during the next year would consist of the completion of one or two heavy orders which they had had in hand for the last two years: he alluded to the *Powerful*, *Juno* and *Doris*, each of which had to be completed this year. So far as he could see, in addition to the work already in hand, prospects for new work looked very favourable. He would not detain them any longer, but hoped they would all enjoy themselves, for "All work and no play made Jack a dull boy." They always worked hard, but that night they were going to enjoy themselves. And they did enjoy themselves thoroughly. Mr. and Mrs. Adamson led off the ball in the grand march, and a very pleasant evening was spent by all. So much so was this the case that the desire generally expressed was that Mr. Adamson would make this re-union an annual fixture. There cannot be a question that occasions such as this help very materially to cement friendships and to bring about that happy feeling between masters and men, and between the men in all classes, which helps so much to bring about the very best results in the shape of work accomplished.

Mr. James M'Kechnie, now engineering manager at the Naval Construction and Armaments Co.'s works at Barrow, has had his services to the Spanish Navy most fittingly acknowledged. The King and Queen Regent has conferred upon him the Commandership of the First Class of the Royal Order of Isabel la Catolica, which is a very ancient order, having been established when Spain had extensive colonial possessions across the Spanish Main. In distinction it ranks next to the Golden Fleece and Calatrava, and the insignia is a gold Maltese cross with a star and a green laurel leaf. The motto of the order is "A la lealtad acrisolada." Mr. M'Kechnie, it is scarcely necessary to explain, while engineering manager at the Nervion Works at Bilbao, designed and constructed engines for three magnificent belted cruisers of 20½ knots speed. Her Majesty the Queen of England has graciously granted to Mr. M'Kechnie permission to accept and wear the decoration within the British Empire. Mr. M'Kechnie has in hand at Barrow some very important work. The engines of H.M.S. *Powerful* are already constructed and almost completely built up in the cruiser, as are also the 48 Belleville boilers with which this ship is fitted. In addition to this work he has the engines and Belleville boilers of H.M.S. *Niobe*, the engines and boilers of H.M.S. *Juno* and *Doris*, the engines and boilers of two 30-knot torpedo-boat destroyers, the engines and boilers of two Clan Line steamers, and the tripling of the engines of the *Clan Sinclair*, and a set of new boilers for her.

There is a marked change taking place in the boiler-making world, and it is viewed with much concern by boiler-makers generally. Water-tube boilers have been proved an undoubted success, and the Belleville type of boiler for fast cruisers where rapid steaming is essential, are certainly shown to be a great success, indeed, the highest and best tests ever obtained by these boilers have been at the instance of those put in H.M.S. *Powerful*, at Barrow. That the water-tube boiler will, in future, play a more conspicuous part in Admiralty work is an assured fact, and it is equally certain that the Mercantile Marine will ultimately follow the example of the Admiralty. It is worthy of note that the first water-tube boiler ever adopted in a steamship

was built at Barrow for the s.s. *Howard*, built by the Barrow Shipbuilding Co. This was the Howard boiler, patented by Messrs. Howard, the great agricultural implement makers, of Bedford, which was taken up by the Barrow Co. It did not, however, prove a great success, and had to be taken out of the steamer and replaced by the ordinary type of boiler. The adoption of the water-tube boiler to a great extent in Admiralty and commercial shipping cannot but lead to the detriment of the boiler-maker's trade generally, because most of the work in the new boilers falls to the engineer and not the boiler-maker. This was the cause of the little quarrel at the Barrow Yard some time ago. The matter was referred to arbitration and the engineers got most of their way in the result.

Barrow is talked of as a very likely place for the production of the various types of tubes and pipes which are required in the construction of water-tube boilers, and as there has been a great impetus given to the demand for this class of material, and as the demand seems likely to grow considerably in the future, it is probable that an effort will be made at Barrow to locate some of this new trade in the town.

There is also much talk in Barrow about putting down a big plant for the production of heavy armaments, guns, &c., so as to enable the shipbuilding concerns at Barrow to undertake the complete outfit of a ship for a foreign navy. This was the original intention of those who first founded the Naval Construction and Armaments Co., but the latter half of this double-barrelled name has not yet been brought into actual life. It is felt, however, that sooner or later there will be a development in this direction, or in the formation of another company, to undertake this very important manufacture. It is clear that the big concerns in Sheffield and on the Clyde cannot hope to keep pace with the naval programme of H.M. Government, and also with the orders entrusted to British builders of foreign navies unless means of vastly increasing the output of armaments and guns are furnished. That Barrow is a very desirable locale for this class of work cannot be questioned, as the chief facilities for the transit of the finished article by shipping to any port in the world affords at once a most striking advantage, apart from the fact that a good local demand would be assured.

**West Cumberland.**—The shipbuilding trade in West Cumberland is kept busily employed, and at both the Workington and Maryport yards a steady run of work is observable. No new orders are reported, but builders are busy and have reason to expect a continuance of work so soon as the orders now in hand enable them to accept further commissions.

**Shipbuilding Materials.**—The plate mills at the Barrow Steel Works, which have stood idle for over six months, are again in active operation, and plenty of orders are fortunately to hand. The disagreement between masters and workmen was the first cause of the stoppage of the mills, and an arrangement was not come to until the beginning of November, and then it was found impossible to make a re-start because the engineers' dispute, now at length amicably settled, closed certain shipyards, with the result that builders were not in a position to give out specifications for plates and other material. The order for the plates for H.M.S. *Niobe*, and for the two 30-knot torpedo-boat destroyers placed with the Barrow Co. has been given to the Barrow Steel Co., who hold orders also for Belfast, Liverpool, and even Glasgow shipyards. Plates are at about £4 17s. 6d. per ton for ordinary sections, but as the demand is beginning to increase and will likely exceed the powers of supply, fuller prices are expected. There is a brisk demand for heavy steel castings, especially for Admiralty work, and local orders are being supplemented by orders of a similar nature from various shipbuilding firms.

**The Hematite Trade.**—A distinct improvement is noticeable in the hematite pig-iron trade. The demand is fuller, and makers are so fully sold forward with only 36 furnaces in blast that additional furnaces are being put in blast at once in order to compete with the demand. Stocks are very large, aggregating up to nearly 300,000 tons, but they are held by merchants and others who are very firm and are expecting with makers the fuller prices which an active market will naturally bring about. Steel-makers are big consumers of hematite and are likely on local as well as on general account to require larger deliveries of metal. Iron ore is steady, but has not participated so fully in the improved trade as might have been expected, owing to the fact that large importations of Spanish ore are coming into this district and competing against the native product. It is evident there will have to be

relief in this district in the form of cheaper railway carriage and a reduction of the royalty charges, or the native iron ore trade will suffer and possibly sink out.

**Shipping.**—There is a slight improvement in the shipping trade, and further improvement is looked forward to. The exports of pig-iron from west coast ports up to January 18th this year reached to 20,511 tons, and of steel 29,186 tons, compared with 13,343 tons of pig-iron and 19,120 tons of steel in the corresponding period of last year, an increase of 7,168 tons of pig-iron, and 10,066 tons of steel.

**New Atlantic Greyhounds.**—It is, perhaps, too much to expect critics to read the whole of what they criticise, or even, in all cases, to understand what they read. Yet, when they draw conclusions from what other writers say and then translate them into their own language, and publish their own version of what they imagine the writers meant, they are treading on dangerous ground, and they would be well advised to keep within reasonable limits. A remark was made in these columns an issue or two ago, *apropos* of the two new flyers ordered by the North German Lloyd Co. We spoke of one vessel as being ordered from the Vulcan Co., and then proceeded to say, "The other vessel, however, is placed with the firm of Messrs. F. Schichau, of Elbing, and their work will be peculiarly interesting from the fact that they are new competitors in the field. Their speciality has hitherto been the building of small fast boats. It is as though a British firm got Messrs. Yarrow or Thornycroft to build their version of a *Lucania* or *S. Paul*. The new vessels are to be about 600 ft. long, and of a speed about equal to that of the crack Cunarders. But they are not to be sisters, the designs of the two contracting firms being far from identical. This will lend an exceptional interest to the performance of the new steamers." It is interesting to see how largely a writer in the *Trades' Journal Review* follows us by the closeness of his imitation. He paraphrases our last sentences by saying, "It will be interesting to watch the performances of these new steamers which are to differ somewhat in design. They are to be about 600 ft. long, and are expected to be quite equal in speed to any now running between Liverpool and New York." Our remark as to the novelty of the new departure is also assimilated in the same way, for he says (speaking of the firm of Herr F. Schichau), "it is an unusual order for a firm to receive, for hitherto their speciality has been the building of torpedo-boats and other light craft." But he has the audacity to go on: "But the *MARINE ENGINEER* is mistaken in supposing that such an order may be beyond the capabilities of Mr. Schichau's establishment." We assumed nothing of the kind. If we had done so we should have expressed our ignorance of what we were writing about as carefully as has the writer in the *Trades' Journal Review* here exposed his incapacity for understanding what he works up from other people's writings. The Elbing firm is quite capable of doing good work in big ships as in little, and those who live a few months will see proof of the fact.

**Richards' Plastic Metal.**—We have received from Messrs. J. H. Richards & Co., of Corporation Street, Birmingham, particulars of J. Richards' Plastic Metal for lining up all kinds of machinery, and which they inform us is now used for the British and Foreign Governments, and several of the leading steamship, railway, and tramway companies. From the information before us it appears to be possessed of great durability, adhesiveness, and anti-frictional qualities, while its easy manipulation admits of its being applied to many kinds of metal such as gun-metal, steel, wrought, or cast, iron, &c., and from these when properly applied no amount of abrasive force will remove it, thus dispensing with the necessity for, and trouble and expense of, recessing or pegging. In weight Richards' metal compares favourably with other makers, being from 15 to 30 per cent. lighter, while the saving effected in lubrication has been stated by actual users to amount, in some cases, to over 30 per cent. This metal has been used on the steamers of the "City" Line for repairing and making up brass bushes of some of the high-speed engines, and for parts of the main engines, such as crank-pins, eccentric straps, crosshead brasses, &c., and for lining up all kinds of small work, and in every instance, as is testified by the superintendent engineer, it has given the utmost satisfaction. It has also been used for coating the tips of propeller blades to prevent corrosion, a purpose it admirably fulfilled.

## LAUNCHES AND TRIAL TRIPS.

## LAUNCHES—ENGLISH.

**Bells.**—On December 14th Messrs. W. Dobson & Co. launched at Low Walker-on-Tyne, a steamer built to the order of Messrs. G. & C. E. Bell, Newcastle. She will have a deadweight carrying capacity of 8,400 tons, and the engines will be supplied by Messrs. Blair & Co., Stockton. The vessel was named the *Bells*.

**Sonnenburg.**—On Saturday, December 14th, Messrs. Wigham Richardson & Co., launched from their Neptune Shipyard a finely modelled steel screw steamer, which they are building to the order of the Deutsche Dampfschiffahrts Gesellschaft Hansa, of Bremen, and which is intended for the service of that company between Europe and the River Plate. The steamer is 815 ft. in length by 42 ft. beam, and will be fitted with four-crank quadruple-expansion engines, also constructed by Messrs. Wigham Richardson & Co., balanced in accordance with the Yarrow, Schlick & Tweedy system, a system which is now coming so rapidly to the front on account of its admirable results, both with regard to the diminished consumption of fuel and the complete absence of vibration. The owners of the steamer were represented at the launch by their superintending engineer, Mr. D. Wulff, under whose guidance the steamer is being built. As the vessel left the ways she was named the *Sonnenburg*, the ceremony being performed by Masters Christie and Bridge.

**Chiswick.**—On December 16th Messrs. Ropner & Son, of Stockton, launched a steel screw steamer of the following dimensions, viz.:—Length between perpendiculars, 280 ft.; breadth, 40 ft.; moulded depth, 18 ft. 6 in., which they have built for London owners. The steamer is built off the part-awning decked rule, with poop and raised quarterdeck, her deadweight carrying capacity being 8,000 tons on 17½ ft. The saloon and cabins for captain and officers are fitted in the poop, the engineers' accommodation being amidships. She is built on the web-frame principle, leaving the holds entirely clear for cargo, and has a cellular bottom and after peak arranged for water ballast. All labour-saving appliances are fitted for the economical working of the steamer, and also for the expeditious loading and unloading of cargoes. She has steam steering gear amidships, four powerful steam winches, a large multitubular donkey boiler, direct steam windlass, stockless anchors, &c. The engines will work up to about 750 effective H.P., and are by Messrs. Blair & Co., having cylinders 21 in., 34 in., and 56 in. by 36 in. stroke, steam being supplied by two large steel boilers working at 160 lbs. pressure. The vessel was named the *Chiswick* by Mrs. James Spence, of London.

**Grand Duchess Xenia.**—On December 16th a steel steamer, of about 1,960 tons gross, built by Messrs. R. & W. Hawthorn, Leslie & Co., Limited, was launched at Hebburn-on-Tyne, owned by the Russian Steam Navigation and Trading Co.

**Ness.**—On December 17th a steel steamer of about 3,104 tons gross, named the *Ness*, built by Messrs. J. L. Thompson & Co., Limited, was launched at Sunderland. Owned by the Mercantile Steamship Co., Limited.

**Cowrie.**—On December 17th the new steamer *Cowrie* was launched from Sir W. G. Armstrong, Mitchell & Co.'s yard on the Tyne. She is a sister ship to the *Nerite*, lately turned out by the same firm, and has been built to the order of Messrs. M. Samuel & Co., of London and Yokohama, being the fourteenth vessel constructed for them under the superintendence of Messrs. Flannery, Baggallay & Johnson, of London and Liverpool, and specially designed for the carriage of oil in bulk or miscellaneous goods of any description. As in the previous vessels, she will be fitted with all the latest improvements and special facilities for the safe and speedy manipulation of either class of cargo. She is 875 ft. 6 in. long, 48 ft. wide, and 81 ft. 6 in. depth of hold. Her engines are being constructed by the Wallsend Slipway Co., Limited, of Newcastle, and will have cylinders 27½ in., 43½ in. and 78 in. by 48 in. stroke. The vessel was christened by Mrs. Samuel.

**Topaz.**—On December 18th an iron steam ketch, of about 149 tons gross, named the *Topaz*, built by Messrs. Cook, Welton & Gemmell, was launched at Hull, owned by the Kingston Steam Trawling Co., Limited.

**Bovic.**—On December 18th an iron steam ketch of about 152 tons gross, named the *Bovic*, built by Messrs. Edwards

Brothers, was launched at North Shields; owned by Mr. E. Kelsall.

**Coptic.**—On December 18th a steel steam ketch of about 152 tons gross, named the *Coptic*, built by Messrs. Edwards Bros., was launched at North Shields; owned by Mr. E. Kelsall.

**Annie.**—On December 18th the *Annie*, a steel sailing ketch barge of about 197 tons gross, built by Messrs. J. P. Rennoldson & Son, was launched at North Shields; owned by the Goole and Hull Steam Towing Co.

**Unyoro.**—On December 19th, an iron steam ketch of about 150 tons gross, named the *Unyoro*, built by Messrs. Cochran & Cooper, was launched at Beverley. Owned by the Grimsby Union Steam Fishing Co., Limited.

**Admiral.**—On December 21st an iron steam ketch of about 150 tons, named the *Admiral*, built by Messrs. Cochran & Cooper, was launched at Beverley. Owned by the Anchor Steam Fishing Co., Limited.

**Minister Witte.**—On December 26th a steel schooner-rigged steamer, of 181 tons, named the *Minister Witte*, was launched at Newcastle, owned by the Archangel Mourman Steam Navigation Co., Archangel.

**Richmond.**—On December 30th Messrs. Ropner & Son, of Stockton, launched a steel screw steamer of the following dimensions, viz.:—Length, between perpendiculars, 280 ft.; breadth, 40 ft.; moulded depth, 18 ft. 6 in.; which they have built for London owners, and is a sister ship to the s.s. *Chiswick*, launched a fortnight ago for the same owners. The steamer is built off the part-awning decked rule, with poop and raised quarterdeck, her deadweight carrying capacity being 8,000 tons on 17½ ft. The saloon and cabins for captain and officers are fitted in the poop, the engineers' accommodation being amidships. She is built on the web frame principle, leaving the holds entirely clear for cargo, and has a cellular bottom and after-peak arranged for water ballast. The engines will work up to about 750 effective H.P., and are by Messrs. Blair & Co., having cylinders 21 in., 34 in., 56 in., by 36 in. stroke, steam being supplied by two large steel boilers working at 160 lbs. pressure. On leaving the stocks Miss Nina Florence Munro, of Billingham Hall, Stockton-on-Tees, gave her the name of *Richmond*.

**Birnam.**—On December 30th there was launched from the shipbuilding yard of Messrs. Readhead & Sons, West Docks, South Shields, a steel screw steamer, built to the order of Messrs. M'Lean, Doughty & Co., West Hartlepool. The vessel is of the improved single deck type, and is of the following dimensions:—Length, 304 ft.; breadth, 44 ft.; and depth moulded, 28 ft. 1 in.; her deadweight capacity being about 1,400 tons on a light draught. Her engines, also constructed by Messrs. John Readhead & Sons, are of the triple-expansion type, having cylinders 23 in., 37½ in., and 61½ in. by 39 in. stroke, steam being supplied by two large steel boilers working at a pressure of 160 lbs. per square inch. As the vessel left the ways she was named the *Birnam*, by Mrs. Fred M'Lean. This is the ninth vessel built by the West Dock firm for the above owners. Mr. Henry Abey, of West Hartlepool, has superintended the building of the hull and the construction of the machinery.

**Wolfsburg.**—On Monday, December 30th, Sir Raylton Dixon & Co., launched from the Cleveland Dockyard, Middlesbrough, the fine steel-screw steamer *Wolfsburg*, built to the order of the Hansa Steamship Co., of Bremen, under the supervision of Mr. D. Wulff, their superintendent engineer. The principle dimensions of the vessel are:—Length, 323 ft.; beam, extreme, 42 ft. 6 in.; depth, moulded, 25 ft. She is built to Lloyd's 100 A1 class, spar deck rule, the poop, bridge, and forecabin decks being of oak. The captain, officers, and engineers are accommodated in houses handsomely fitted up on bridge deck, and the crew and firemen are berthed in commodious quarters in topgallant forecabin. Triple-expansion engines, built to German law requirements, will be supplied by Messrs. T. Richardson & Sons, Limited, Hartlepool, having cylinders 22½ in., 38 in. and 62 in. by 42 in. stroke, with two large single-ended boilers working at 200 lbs. pressure. This is the seventh steamer Sir Raylton Dixon & Co. have launched for the Hansa Co. within two years, another steamer being on the stocks for the same owners. On leaving the ways the vessel was named *Wolfsburg* by Mrs. W. L. Johnson.



**Baluchistan.**—On Tuesday, December 31st, Messrs. William Gray & Co., Limited, launched a fine steel screw steamer of the following dimensions, viz.:—Length, over all, 300 ft.; breadth, 42 ft.; depth, 19 ft. 9 in. She has been built to the order of Messrs. Frank C. Strick and Co., Limited, of Swansea and London, and will take Lloyd's highest class. The deck erections consist of poop, raised quarter-deck, and partial awning deck. A handsome saloon, state-room, and accommodation for captain and officers will be fitted up in the poop, and comfortable quarters for the engineers amidships, and for the crew forward. The hull is built with web frames and cellular double bottom, and there is also a large ballast tank in the after peak. Four steam winches, large donkey boiler, steam steering gear amidships, hand screw steering gear aft, direct steam windlass, schooner rig, boats on beams overhead, iron grain divisions, and all modern appliances will be fitted. The engines are of the triple-expansion type, working on three cranks. They are supplied by the Central Marine Engine Works of Messrs. Wm. Gray & Co., Limited. The cylinders are 23 in., 35 in. and 59 in. diameter, and the piston strokes 39 in. The boilers, built of steel, are of large size, and will give an ample supply of steam at a working pressure of 160 lbs. per square inch. The vessel has been superintended during construction by Mr. Archibald Walker, on behalf of the owners. The ceremony of naming the ship *Baluchistan* was gracefully performed by Miss Kitty Baines, of West Hartlepool.

**Anapa.**—On December 31st there was launched from the Jarroo Yard of Messrs. Palmer's Shipbuilding and Iron Co., Limited, a finely-modelled steel screw steamer, built to the order of Mr. James Marke Wood, of Liverpool. Her dimensions are as follows:—Length, between perpendiculars, 350 ft.; beam, moulded, 45 ft.; depth, moulded, 28 ft. 6 in. The vessel has been built under special survey to class 100A in Lloyd's Register, and is of the spar deck type, having a poop, bridge, and fore-castle. Two complete steel decks are laid extending all fore and aft. The poop is fitted for cargo, and the officers and engineers berths being on the bridge, in a large steel deck-house, and the crew in the fore-castle. Water ballast is provided fore and aft in a cellular bottom, and in a deep hold tank amidships. All the necessary requirements to fit the vessel for general and grain cargoes are complied with, and all the most modern improvements for the safe handling of the vessel, and rapid loading and discharging of cargo, are supplied and fitted throughout. The vessel is designed to load a deadweight of about 5,500 tons on Lloyd's Summer draught. As the vessel left the ways she was gracefully christened the *Anapa* by Miss Nellie Hill, daughter of Mr. Maxwell Hill, naval architect, of Newcastle, under whose supervision the vessel is being constructed.

**Swanley.**—On Monday afternoon, January 13th, Messrs. Richardson, Duck & Co. launched from their yard a steel screw steamer of the following dimensions:—Length, over all, 310 ft.; beam, extreme, 43 ft.; depth, moulded, 22 ft. 9 in.; tonnage, gross, about 2,360 tons. This vessel has been built to the order of Messrs. Harris & Dixon, of London. She will take Lloyd's 100 A1 class, and has been built under special survey. She is in every respect a duplicate of the *s.s. Cranley*, built for the same owners in November last. Engines by Messrs. Blair & Co., 22½ in. 37 in., and 61 in. by 42 in.; two single-ended boilers, 120 lbs. pressure. The vessel has been superintended during construction by Mr. H. M. Rogers, the owners' superintendent, and Captain Steel will take command. On leaving the ways she was christened *Swanley* by Miss M. H. Rogers, of Bromley, Kent.

**Algoa.**—On the afternoon of January 14th there was launched from the shipbuilding yard of Messrs. Wm. Doxford & Sons, at Pallion, the largest cargo boat ever built on the Wear, and, with the exception of the *Georgie* and her sister ship, built by Messrs. Harland & Wolff at Belfast, the largest cargo-carrying boat afloat. The vessel, which, as she left the ways was christened the *Algoa*, has been built to the order of Messrs. Crow, Rudolph & Co., of Liverpool, and has a deadweight carrying capacity of 11,800 tons. The builders' description furnished to the Press states that the vessel is 475 ft. long, 58 ft. wide, and 34 ft. 8 in. deep. She has been plated on the Bell-Rockliff system, whereby packing is dispensed with, and, besides being on this account some 68 tons lighter than if plated on the old system, she presents a much handsomer appearance. It is not only by the absence of packing that the weight of material

used under this new system of plating is lessened, but also by the employment of shorter rivets in fastening outside strakes, and by using a smaller quantity of cement in the vessel's interior. As the reduction from these three different sources of saving admits of the safe loading of extra cargo to an equal amount, it will be seen that the *Algoa* possesses quite a unique advantage as compared with most other large cargo boats. For the purpose of facilitating the loading and discharging of her cargo, the vessel is fitted with 18 derricks. Her construction has been under the superintendence of Mr. F. J. Pilcher, of Liverpool, and the christening ceremony was performed by Miss Crow, of Liverpool. At the completion of the launch the vessel was moored under the sheerlegs for the purpose of being fitted with her engines and boilers, which have been constructed in the engineering department of the firm, their nominal horsepower being registered at 8,000.

**Pendower.**—On the afternoon of January 14th Messrs. Irvine & Co., West Hartlepool, launched a fine steel screw steamer of about 4,100 tons deadweight carrying capacity, built to the order of Messrs. The London and Northern Steamship Co. (Pyman Bros., managers), London. The vessel will take Lloyd's highest class, and has been built under special survey. Her dimensions are—Length, 314 ft.; breadth, 44 ft., and depth, 23 ft. 3 in. The deck erections consist of poop, bridge and top-gallant fore-castle. The saloon and cabins for captain and officers are fitted up in the poop. The engineers are berthed under bridge deck at sides of engine-room, and the crew in top-gallant fore-castle. The hull is built on the web-frame principle with double bottom for water ballast fore and aft. Large hatchways are fitted, four steam winches by Irvine & Co., steam steering gear amidships, screw gear aft, two large donkey boilers and direct steam windlass by Emerson, Walker & Co. The boats are placed on beams overhead and all modern appliances will be fitted for general trading. Engines of the triple-expansion type are being supplied by Messrs. Blair & Co., Limited, Stockton-on-Tees. The hull and machinery have been built under the supervision of the owners' superintendents, Captain T. A. Pyman and Mr. Cromar. The christening ceremony was gracefully performed by Miss Madeline Pyman, who named the vessel *Pendower*.

**Duano.**—On January 15th Messrs. John Blumer & Co. launched the steel screw steamer *Duano*, built to the order of Messrs. Sigismondo Copatich & Co., of Fiume. The vessel, when completed, is to take the highest class at Lloyd's under special survey—100A, steel partial awning deck. The following are the main dimensions and particulars:—Length, between perpendiculars, 255 ft.; beam, 35 ft. 6 in.; depth moulded, 18 ft. 2 in.; with a deadweight carrying capacity of about 2,400 tons on 17 ft. 2 in. draught. Water ballast is fitted in cellular bottom and after peak. The captain and officers have tastefully fitted-out accommodation under poop. The engineers have the same under after part of partial awning deck, whilst the sailors and firemen have spacious berths under fore part of partial awning deck. The deck machinery is of the most improved type, and comprises four powerful steam winches by Messrs. Roger & Co., of Stockton; large donkey boiler to work the same by Messrs. Riley Brothers, of Stockton; steam steering gear by Messrs. Alley & MacLellan, Glasgow; steam windlass by Messrs. Emerson, Walker & Co.; and after gear by Messrs. John Hastie & Co., of Greenock. The whole deck work is arranged with a view to the rapid loading and discharging of cargo. The engines and boiler are being built by Messrs. Geo. Clark, Limited, Southwick. The sizes of the cylinders are 19 in., 31 in., and 51 in., with a stroke of 35 in. The boiler is of steel, having a pressure of 160 lbs. per square inch. On leaving the ways the vessel was named by Captain Moise Pollich, of Fiume.

**Maria Rickmers.**—On Thursday afternoon, January 16th, Messrs. Joseph L. Thompson & Sons, Limited, North Sands Shipbuilding Yard, Sunderland, launched this finely-modelled steel screw steamer, built to the order of Messrs. Rickmers, Reismuhlen, Rhederei & Schiffbau A.G., of Bremen. The vessel is 427 ft. long, 50 ft. 6 in. wide, and 30 ft. deep, moulded, and is designed to carry a deadweight of over 7,200 tons with Lloyd's summer freeboard. She has been built to Lloyd's highest class under special survey on the three deck rules, and has a full poop, long bridge, and topgallant fore-castle. The poop is arranged for cargo, and the officers, engineers, spare state-rooms, and saloon in a house built on top of the bridge deck. On the top of this house is placed the chart and wheel-

house. The crew are berthed in the topgallant fore-castle. The vessel is built on the web frame principle, with intercostal stringers right fore and aft. The upper and main decks are of steel, the poop, bridge, and fore-castle decks being of wood. Special attention has been paid to the loading and discharging arrangements, nine derricks being fitted, six of which are of steel. Seven powerful steam winches are placed on deck at the hatches, whilst the steam windlass is on the fore-castle deck. The steam steering gear is placed at the after end of the engine-room, and is controlled by a wheel from the steering house on the bridge deck forward. A powerful screw gear is placed at the after end of the poop. Water ballast is carried in a cellular double bottom right fore and aft, and in the after peak. The vessel is fore-and-aft schooner rigged with pole masts. On the upper bridge deck amidships are placed four large boats, the two lifeboats being of seamless steel. The vessel has a graceful clipper stem finished off with a well-carved figure-head, and elaborate trail boards running away from this. The steamer is intended for Messrs. Rickmers' line between Europe and the East, and will further add to the reputation of the builders, being a notable addition to the many modern up-to-date cargo carriers which they have recently turned out. The engines, by Messrs. George Clark, Limited, are of the following sizes:—27 in., 43 in., and 72 in., with a stroke of 48 in. Steam is supplied by four large multi-tubular boilers working at 180 lbs. pressure, and all the most modern improvements in propelling machinery are fitted. The launch, which was witnessed by a large number of people, was most successful, the vessel on leaving the ways being gracefully christened the *Maria Rickmers* by Mrs. Adolph Heine, wife of Messrs. Rickmers' superintending engineer.

**Parkhurst.**—On Thursday, January 16th, Messrs. Wm. Gray & Co., Limited, launched a fine steel screw steamer built to Lloyd's highest class, and of the following dimensions:—Length, over all, 324 ft.; breadth, 44 ft.; and depth, 23 ft. 3 in.; deadweight, over 4,100 tons, on a draught of about 19 ft. The deck erections consist of a poop, bridge over machinery space, and topgallant fore-castle. A handsome saloon and cabins for officers, &c., are fitted in the poop, the engineers' rooms are in the bridge, and the crew's accommodation forward. The hull is built on the web frame system, with a cellular double bottom, large hatchways, powerful steam winches, steam steering gear amidships, hand screw gear aft, patent donkey boiler, patent direct steam windlass, boats on beams overhead, shifting boards throughout, stockless anchors, two masts with schooner rig, and a complete outfit for a first-class cargo vessel. The Central Marine Engine Works of Messrs. Wm. Gray & Co., Limited, supply triple-expansion engines, having cylinders 23 in., 36 in., and 62 in. diameter, with a 39 in. piston stroke, and two large steel boilers to work at 160 lbs. pressure, per square inch. The ceremony of christening the steamer *Parkhurst* was gracefully performed by Miss Winifred Baines, of West Hartlepool, niece of the managing owners.

**Cairnisi.**—On January 16th Messrs. Short Brothers' launched at Sunderland a steel screw steamer built to the order of Messrs. Cairns, Young & Noble, of Newcastle, for their Cairn Line. The dimensions of the vessel are:—Length, 259 ft.; breadth, 36 ft. 9 in.; and depth, moulded, 20 ft. 4 in.; with a deadweight carrying capacity of about 2,600 tons. The vessel, which is classed 100 A1 at Lloyd's, has been built for the general carrying trade. She was named *Cairnisi*, the ceremony being performed by Miss Gladys Cairns. The ship is to be fitted with triple-expansion engines by Messrs. Black, Hawthorn & Co., Limited, Gateshead, the cylinders being 19 in., 31 in., and 51 in. diameter, with a stroke of 36 in., the working pressure being 160 lbs.

#### LAUNCHES—SCOTCH.

**Dover.**—On December 2nd Messrs. W. Denny & Brothers, Dumbarton, launched the paddle steamer *Dover*, of 280 ft. length, built by them for the London, Chatham and Dover Railway Co.'s service between Dover and Calais. Triple-expansion engines are being supplied by Messrs. Denny & Co.

**Craig-Gowan.**—On December 17th a steel schooner-rigged steamer, of about 110 tons gross, named the *Craig-Gowan*, was launched at Aberdeen; owned by Messrs. Brown & Co.

**Craigellachie.**—On December 17th a steel schooner-rigged steamer, of about 110 tons gross, named the *Craigellachie*, was launched at Aberdeen; owned by Messrs. J. Brown & Co.

**Chow Tai.**—On December 17th the Fairfield Shipbuilding Co. launched at Govan, the *Chow Tai*, a steamer of about 1,800 tons gross, and of the following dimensions:—Length, between perpendiculars, 200 ft.; breadth, 38 ft.; depth, moulded, 22 ft. 9 in. She is the second of two steamers built by the Fairfield Co. for the Scottish Oriental Steamship Co., for whom they have already built a dozen steamers. Her sister ship is the *Wong Koi*.

**Steel Screw Steamer.**—There was launched on December 18th, from the shipbuilding yard of Messrs. John Scott & Co., Abden, Kinghorn, a steel screw steamer, which has been built to the order of the Wallasey Urban District Council of Egremont. The steamer is 101 ft. by 20 ft. by 10 ft. 6 in., and is specially designed as a tender for the Wallasey ferry steamers. She has been built under the superintendence of the Council's superintending engineer, Mr. Orme. The christening ceremony was gracefully performed by Mrs. Orme.

**Odessa.**—On December 18th a steel steamer, of about 116 tons gross, named the *Odessa*, built by Messrs. D. J. Dunlop & Co., was launched at Port Glasgow; owned by the Compagnie Generale Transatlantique.

**Paes de Carvalho.**—On December 18th Messrs. Gourlay Brothers & Co., Dundee, launched a steel twin-screw steamer, built for the Amazon Steam Navigation Co., South America. The vessel is 450 tons gross. In length the steamer is 172 ft.; in breadth, 33 ft.; and in depth, 8 ft. 9 in.

**Voronej.**—On December 19th Messrs. William Denny & Brothers launched from their shipbuilding yard at Dumbarton a twin-screw steamship, of the following dimensions:—43½ ft. by 49 ft. 8 in. by 29 ft. 16 in., and of about 5,850 tons gross measurement. She has been built to the order of the Russian Volunteer Fleet, and is a duplicate of the twin-screw steamer *Vladimir*, built by Messrs. Wm. Denny & Brothers for the same owners in April last. Her machinery will be supplied by Messrs. Denny & Co. The ceremony of naming the vessel the *Voronej* was performed by Miss Ward, daughter of Mr. John Ward, one of the partners of the firm.

**Australian.**—On Saturday, December 28th, Messrs. R. Napier & Sons, Limited, launched from their shipbuilding yard at Govan a steel screw steamer of about 3,000 tons gross for the Eastern and Australian Steamship Co., London. The vessel, which is named the *Australian*, has been specially designed for the company's important service between Australia, China, and Japan, and is fitted with the most modern appliances for the comfort of the passengers and the efficient working of the ship and cargo, including a complete installation of the electric light, with duplicate dynamos. There is also refrigerating machinery and chambers for the transport of frozen meat, &c. The general dimensions are:—Length, 330 ft.; breadth, 42 ft.; depth, 25 ft. The vessel has a topgallant fore-castle, long bridge, and a full poop. The hull and machinery have been constructed under special survey to Lloyd's highest class and in accordance with the Board of Trade requirements for passenger steamers. The upper decks and fitting are of teakwood. As the vessel will be employed in tropical climates, the passenger accommodation has been placed on the upper deck, which admits of perfect ventilation, and consists of luxurious rooms amidships for 50 first-class passengers. The large and roomy state-rooms are situated on the upper deck, and are furnished with the most recent improvements, including wire-woven mattresses, folding lavatories, electric bells, &c. Above, on the bridge deck, is a handsome dining saloon, music-room, and smoke-room, in polished hardwood, with a sun deck overhead on which the boats are placed, and which forms a sheltered promenade for the first-class passengers. The second-class passengers—there is accommodation for 40—have very comfortable quarters in the poop, with a dining-saloon, smoking-room, and large state-rooms; while the 'tween decks afford spacious accommodation for emigrants or troops. The machinery, which is supplied by the builders, consists of a set of triple-expansion engines capable of indicating 2,000 H.P., with two steel boilers for a working pressure of 175 lbs. Having been built with a cut-water bow and figure-head, the vessel has a very handsome appearance, which will be enhanced by a smart two-masted rig, and is altogether a fine specimen of a high-class passenger and cargo steamer. When all was ready for launching the boat, the christening ceremony was performed by the Hon. Mrs. C. E. Bright. After being successfully launched the *Australian* was towed up the harbour, where she will be fitted with machinery.

**Hunter.**—On December 28th the Fairfield Shipbuilding and Engineering Co., Limited, launched from their yard at Govan, H.M.S. *Hunter*, the last of the three 27-knot torpedo-boat destroyers which the company have built for the British Government. The sister vessels, *Handy* and *Hart*, were launched in March of last year. The dimensions of each are:—Length, 194 ft.; breadth, 19 ft. 4½ in.; draught, 5 ft. 7 in. The engines are of the ordinary triple-expansion type, and of about 4,600 I.H.P. The boilers of the boats are a slight modification of the well-known Thornycroft boiler, the wisdom of using which has been proved by the comparative ease with which the guaranteed speed has been reached by the two vessels previously launched.

**Prudente de Moraes.**—On December 28th Messrs. Russell & Co. launched at Port-Glasgow a twin-screw steamer of 475 tons gross, for the Amazon Steam Navigation Co., London. Her dimensions are:—Length, 172 ft.; breadth, 33 ft.; and depth to main deck, 8 ft. 9 in. The vessel was named *Prudente de Moraes*. Messrs. Rankin & Blackmore, Greenock, will supply the engines, the cylinders being 10 in., 16 in., and 26 in., by 21 in. stroke.

**Lauro Sodre.**—On December 30th, Messrs. Russell & Co. launched at Port-Glasgow the screw steamer *Lauro Sodre*, to the order of the Amazon Steam Navigation Co. This steamer is a duplicate of the *Prudente de Moraes*, recently launched for the same owners, is built to Lloyd's river class, and is intended for passenger and cargo service on the River Amazon. The dimensions are:—Length, 172 ft.; breadth, 33 ft.; depth, 8 ft.; and the vessel will measure about 500 tons gross. Triple-expansion engines will be supplied by Messrs. Kincaid & Co., Greenock, with cylinders of 10 in., 16 in. and 26 in., by 21 in. stroke.

**Haimun.**—On January 3rd there was launched from the Glen Yard of Messrs. William Hamilton & Co., Port-Glasgow, a steel screw steamer for the Douglas Steamship Co., Limited, of Hong Kong. She is fitted out for passengers and cargo. As she left the ways she was gracefully named *Haimun*, which in Chinese means the "Gate of the Sea," by Mrs. Cassels, of Hamilton. She is to be engaged by Messrs. Hutson & Son, of Glasgow. The vessel has been built under the superintendence of Captain F. Ashton, of Hong Kong.

**Peter Johnstone.**—On January 4th a steel steamer, of 110 tons, named the *Peter Johnstone*, was launched at Aberdeen. Owned by Mr. P. Johnstone, Aberdeen.

**Antonio Olyntho.**—On January 11th Messrs. Gourlay Brothers launched at Dundee the twin-screw steamer *Antonio Olyntho*, which has been built to the order of the Amazon Steam Navigation Co., Para. This vessel, which is specially adapted for river traffic, is similar in all respects to her sister ship *Paes de Carvalho*, which was launched about three weeks ago. The dimensions of both vessels are the same, namely, 178 ft. long, 33 ft. broad, and 8 ft. 9 in. deep.

**Steam Hopper.**—On January 13th Messrs. Fleming & Ferguson, Limited, launched at Paisley the second of three steam hoppers which they are constructing to the order of the Admiralty for Portsmouth Dockyard. The dimensions of the vessel are 155 ft. by 31 ft. by 12 ft. 5 in., and she has a carrying capacity of 600 tons. The engines and machinery will be supplied by the builders.

**Grenada.**—On Thursday, January 16th, Messrs. Alex. Stephen & Sons launched from their shipbuilding and engineering works at Linthouse, a beautifully modelled steel screw steamer, built to the order of Messrs. George Christall & Co., of Glasgow and New York, for their trade between the latter port and the West Indies, and of the following dimensions:—Length, between perpendiculars, 281½ ft.; breadth, 39 ft.; depth, 25½ ft., giving a gross tonnage of about 2,200 tons. She has been constructed under special survey of Lloyd's, for their 100 A1 spar-deck class, and also conforms with all the Board of Trade requirements for passenger certificate. The deck erections consist of full poop, bridge house and topgallant forecastle. She has a double bottom on the cellular principle for water ballast, has six steam winches, steam windlass, steam steering gear, and all the latest and most approved appliances for the efficient handling of ship and cargo. All the weather decks are sheathed with teak. Accommodation of a very superior character is provided under the bridge deck for about 40 first-class passengers, the large and airy state-rooms being ranged on each side with

the saloon at fore end full breadth of the vessel. The saloon, companionway or social hall, and smoking-room are beautifully decorated apartments. The walls of saloon are decorated with tapestry of a chaste design, as also the ceilings, while the dado work, sideboards and light framing of spaces between tapestry-panels are a combination of golden-tinted satin, walnut and satinwood mellowed by staining. The saloon is approached from the companionway by a handsome staircase of teak. The social hall and companionway are also decorated with tapestry panels, and the hardwood of the dado in stained ash and walnut framing. The smoking-room is of the same character as companion, but with teak wood framing and tapestry panels. The state-rooms are replete with every modern comfort and are fitted with Hostin's folding beds, patent folding lavatories, &c. The upholstery work is in keeping with the general design, and will have a very pleasing appearance. The captain's room is on the upper bridge, and is fitted up in a substantial and comfortable manner. The officers, petty officers, &c., are under the fore-castle in large and airy state-rooms, while the crew are located aft under the poop; the vessel being intended for trading in a hot climate, special attention has been given to the ventilation. A complete installation of electric light has been fitted throughout, as also electric bells. The engines, which were fitted on board before launching, are of the most improved triple-expansion type, having cylinders 23 in., 37 in., and 62 in. diameter, by 42 in. stroke, steam being supplied by two large single-ended boilers at 180 lbs. pressure. On leaving the ways the vessel was gracefully named *Grenada*, by Miss Minnie Balfour, of 51, George Square, Edinburgh.

**Iolaire.**—On January 16th a splendid yacht was launched at Leith for Sir Donald Currie, M.P. The vessel has been built by Messrs. Ramage & Ferguson, and as Sir Donald Currie is commodore of the Royal Forth Yacht Club, she will be the flagship of the squadron. The ceremony of naming the vessel the *Iolaire* was gracefully performed by Lady Currie, in presence of a large company, amongst whom were Lady Pearson, Miss Bonar, Mrs. James Currie, Misses Currie, and many friends of the builders and owner. After the ceremony the company were entertained to luncheon by the builders—Messrs. Ramage & Ferguson being respectively chairman and croupier. The toast of "Success to the *Iolaire*," coupled with the names of Sir Donald and Lady Currie, was given from the chair, and was replied to by Sir Donald in an interesting speech, in which he indulged in some reminiscences with regard to his connection with Leith, and his career as a ship-owner. Touching upon South African affairs, he expressed the strong desire and expectation that present troubles would not adversely affect the prosperity and development of the several divisions of that continent. In a subsequent speech he humourously replied to the toast of "Lady Currie's health." "The Builders" and other toasts followed. The *Iolaire* is a screw steam yacht of about 700 tons. Her length is 203 feet; breadth, 27 ft. 6 in.; and depth, 17 ft. 8 in. The engines will be of the triple-expansion type, with cylinders of 18 in., 29½ in., and 48 in., and a stroke of 33 in. One large boiler will supply the steam up to 170 lbs. working pressure, and 850 H.P. will be developed. It is expected the speed of the *Iolaire* will be from 12 to 13 knots. On reaching the water the yacht was seen to have a most graceful outline. For figurehead she has a golden eagle (*Iolaire* being the Gaelic word for "Eagle"). She has two tall raking masts and funnel. There is an extensive deck-house, which, as well as the deck itself, is of teak; also a steering-house on the navigating bridge. The cabins are fitted up in a particularly solid and artistic manner, the principal saloon in a specially selected Spanish mahogany. This, with a lofty ceiling and large skylight, gives the saloon a very handsome as well as spacious appearance. The upholstery is all to be in beautiful French tapestry.

**Bellalisa.**—On January 18th Messrs. David and William Henderson & Co. launched from their shipbuilding yard at Partick on the Clyde a handsomely-modelled steel screw steamer, which they have built to the order of Messrs. Bell Bros. & M'Lelland, of Glasgow. The dimensions are:—Length, 350 ft.; breadth, 45 ft.; depth, 28½ ft. The vessel has been built under the special survey of the British Corporation for the highest class in their registry, B.S. The double bottom is fitted with water ballast fore and aft, and the after peak for use as a trimming tank. There are two complete steel decks, and the upper deck is sheathed with pine. The deck erections

consist of a poop, bridge, and fore-castle. The accommodation for passengers, officers, and engineers is in houses on the bridge deck. The saloon is handsomely finished in polished hardwood, and all the state-rooms and officers' rooms are of large size and very completely furnished. A large teak house is fitted on the top of the saloon house, containing chart-room and wheelhouse. The upper navigating bridge is on the top of this. The crew are berthed in the top-gallant fore-castle, which also contains their washhouses, store-rooms, &c. The cargo gear is of the most complete description, including seven large steam winches, and double derricks at each hatch, capable of lifting weights up to five tons. The masts are telescopic, to render the vessel suitable for the Manchester Ship Canal. The outfit includes steam steering gear, steam windlass, and patent steering and engine telegraphs. The machinery, which has been constructed by the builders' firm, consists of a set of triple-expansion engines, with cylinders 24 in., 40 in. and 66 in. diameter respectively by 48 in. stroke, suited for a working pressure of 165 lbs., and two large single-ended boilers, which are fitted with Howden's system of forced draught. During construction the hull and machinery have been under the personal supervision of Mr. P. Gifford, the owners' superintendent. As the vessel left the ways she was named *Bellave*, by Lady Bell, wife of Sir James Bell, Bart., Lord Provost of Glasgow.

**St. Ives.**—On January 20th Messrs. Wm. Simons & Co., Limited, Renfrew, launched the first of two very powerful bargelading dredgers, constructed to the order of the British Admiralty. The vessel, which is named *St. Ives*, is to be employed at Portsmouth Dockyard, and is of the following dimensions:—Length, 195 ft.; breadth, 85½ ft.; depth, 13 ft. She is propelled by two sets of compound surface-condensing engines of 1,000 I.H.P. (either set of engines being available for dredging), and has all the latest improvements in dredging appliances. The hoisting gear for bucket ladder, the bow and stern winches, and the side shoots for filling hopper barges are driven by independent engines. The length of the bucket ladder enables the buckets to dredge to a depth of 46 ft. The rooms for officers and crew are placed on each side of the bucket well, and are comfortably fitted up. The dredger was launched with all her machinery on board, and in a few days will leave the Clyde for Portsmouth. Messrs. Huxham, Stewart & Scoggins, Admiralty Overseers, under whose direction the dredger was constructed, represented the Admiralty at the launch.

**Bellave.**—On January 20th Messrs. Charles Connell & Co., Whiteinch, launched from their Scotstoun Shipbuilding yard a steel screw steamer for Messrs. Bell Bros. & McLelland, of Glasgow. The dimensions are:—Length, between perpendiculars, 350 ft.; extreme breadth, 45 ft.; depth moulded, 28 ft. 6 in.; with a gross tonnage of about 3,800 tons, and deadweight carrying capacity of 5,750 tons. She has been built under special survey to British Corporation's highest class, with cellular double bottom right fore and aft with transverse divisions, forming six separate compartments for water ballast. The upper and main decks right fore and aft are of steel, the upper deck being sheathed with pine, while the poop, bridge, and fore-castle decks are also of pine. She has seven large hatches, each hatch being fully equipped with winches and double derricks completely arranged for speedy loading and discharging; while she is fitted with a powerful Clarke, Chapman steam windlass, Caldwell's steam steering gear, and all the most modern appliances for the safety and efficient working of the vessel. Accommodation is provided in house on bridge deck for saloon, captain's, officers', engineers and a few spare rooms, all being fitted up in a handsome and comfortable manner—the crew, as usual, being berthed in topgallant fore-castle, this leaves poop and bridge available for cargo. The chart and wheelhouse, of teak, is fitted on top of saloon house, with a flying bridge on top of chart-house, for navigating purposes. She will be rigged as a two-masted fore-and-aft schooner, with telescopic top-masts to suit the Manchester Canal. The engines, which are of the most improved triple-expansion type, having cylinders 24 in., 40 in., and 66 in. in diameter, by 48 in. stroke, worked by two single-ended boilers suitable for a working pressure of 165 lbs., and fitted with Howden's system of forced draught, are being constructed by Messrs. D. Rowan & Son, Glasgow. Both hull and machinery have been constructed under the personal supervision of Mr. Paterson Gifford, the owners'

superintendent. As the steamer left the ways she was named *Bellave* in the customary manner by Miss Bell, daughter of Sir James Bell, Bart., Lord Provost of Glasgow.

**Calais.**—On January 20th Messrs. William Denny & Bros., Dumbarton, successfully launched the paddle steamer *Calais*, which they are building for the London, Chatham and Dover Railway Co. for their Royal Mail route between Dover and Calais. The vessel is a sister ship to the *Dover*, launched by the firm in December last. The naming ceremony was performed by Miss Urquhart, of Glasgow, and the launch was most successful in every way. After the ceremony the party adjourned to the luncheon-room, where Mr. Brock, the managing partner of the firm, proposed the health of the *Calais* and her owners, and hoped the vessels they were building for these owners would prove satisfactory in service. Mr. Messenger replied, and said he was pleased to have this opportunity of expressing how much the railway company appreciated the very pleasant manner in which Messrs. Denny Bros. had enabled the business of the company to be conducted. In conclusion, he asked them to drink the health of the builders, to which Mr. Archibald Denny replied.

**Sound of Jura.**—On January 20th Messrs. Russell & Co., launched at Port-Glasgow a four-masted steel brigantine, of 1,080 tons net register, to carry 1,800 tons cargo. The vessel, which is built to the order of Mr. Charles Walker, Glasgow, is named *Sound of Jura*. The dimensions are:—Length, 210 ft.; breadth, 35 ft. 6 in.; depth, 19 ft. 6 in.

**Rasona.**—On January 27th Messrs. Ramage & Ferguson, Limited, launched from their yard a screw steamer of about 1,000 tons, built to the order of Thomas Cowan Esq., Grangemouth. This vessel has a quarterdeck, bridge and topgallant fore-castle, and has water ballast in a double bottom, except under the engines and boilers, being a duplicate of the s.s. *Naroca*, built for Mr. Cowan by the same builders two years ago. The principal dimensions are:—213 ft. between perpendiculars, by 32 ft., by 14 ft. 6 in. depth moulded, while the machinery consists of triple-expansion engines with cylinders 17 in., 27 in., and 44 in. diameter, by 30 in. stroke, steam being supplied from a large steel boiler, working at 160 lbs. pressure. All the usual appliances for the rapid loading and discharging of cargo have been fitted on board this steamer, and in all respects she is most thoroughly equipped for the trade for which she is intended. On leaving the ways the vessel was named *Rasona* by Mrs. Cowan, of Newhouse, Grangemouth, and among those who were at luncheon in the firm's model room, after the launch, were Mr. Cowan, Mr. and Mrs. Alston, Mr. and Miss Motherwell, Mr. Robertson, of Airdrie, &c., when the toasts usual on such occasions were duly honoured.

## TRIAL TRIPS.

**Kirkhill.**—On December 19th the s.s. *Kirkhill*, built by Messrs. Russell & Co., Port-Glasgow, to the order of Messrs. James R. Cuthbertson & Co., Glasgow, and engaged by Messrs. Dunsmuir & Jackson, Govan, went her trial trip. Her dimensions are:—350 ft. by 43 ft. 2 in. by 29 ft. 8 in. depth, moulded; deadweight carrying capacity, 5,700 tons. Her machinery consists of a set of triple-expansion engines having cylinders 25 in., 40 in., and 66 in. diameter, by 45 in. stroke; two single-ended boilers fitted with Howden's forced draught, and working at a pressure of 170 lbs., Weir's feed pumps, heater, and evaporator, &c. She has a full complement of steam winches and other appliances for speedy loading and discharging, and is fitted up throughout in a first-class manner. On trial a speed of about 11½ knots was obtained with vessel three-fourths loaded, and everything about the machinery worked most satisfactorily. After the trial trip the vessel proceeded to Birkenhead to complete her loading for Bombay.

**Arcturus.**—The large new American auxiliary yacht *Arcturus*, 500 tons yacht measurement, sailed at the end of December from Leith for Cowes, to stay for a few days preparatory to sailing for the Mediterranean, where her owner, Mr. Rutherford Stuyvesant, of New York, will go on board for an extended cruise. This yacht, which has been designed by Mr. St. Clare Byrne, Liverpool, and built by Messrs. Ramage & Ferguson, Limited, Leith, presents many novel features, the most striking of which is a water-

tube boiler of American construction, supplied by the Almy Water-tube Boiler Co., of Providence, Rhode Island, U.S.A. On the official trial trip on December 10th, sufficient steam was easily generated at 150 lbs. pressure to keep the triple-expansion engines going 140 revolutions per minute, giving the highly satisfactory mean speed of nearly 11½ knots on the measured mile, being fully a knot more than what was expected. In firing the boilers and feeding with fresh water, no difficulty whatever was experienced. A comparison could thus easily be made, as duplicate engines in other vessels lately have been supplied with steam from other types of boilers, but with much less efficiency and notably inferior speed. From statistics furnished by the Almy Water-tube Boiler Co. it appears that boilers of their patent type have been largely supplied to American steam yachts as well as other small craft, so with the *Arcturus* in these waters, it may be possible to make some instructive comparisons as to the relative merits of English, French, and American types. The dimensions of the *Arcturus* are—138 ft. length, between perpendiculars, 27 ft. breadth, and 17ft. 5 in. depth, moulded. The engines are triple-expansion, with cylinders 18 in., 21 in. and 34 in. diameter, by 24 in. stroke, working at 165 lbs. pressure, and having a Bevis gun-metal feathering propeller. Three stout Oregon pine masts spread a large area of fore and aft canvas, which should make the yacht give a good account of herself under sail alone. The cabins below, as well as the deckhouses above, are fitted up in an unusually tasteful manner, with a few transatlantic innovations which might well be adopted on this side. Altogether the *Arcturus* is one of the most notable auxiliary steam yachts turned out at Leith for a long time, and her advent in English and Mediterranean waters is watched with much interest by yachtsmen generally.

**Sui Sang.**—On Monday, December 30th, the fine steel screw steamer *Sui Sang*, built by Sir Raylton Dixon & Co., Cleveland Dockyard, Middlesbrough, for Messrs. the Indo-China Steam Navigation Co., Limited, went for her official trial trip in Tees Bay, under the command of Captain Galsworthy. The *s.s. Sui Sang* is 323 ft. long by 41 ft. beam, by 27 ft. 6 in. depth, moulded, and has been built to the requirements of Lloyd's 100A1 class, spar deck rules, her deadweight capacity being about 4,500 tons. The vessel has been specially designed to meet the requirements of the Indo-China Steam Navigation Co.'s trade in the Eastern seas; spar deck is of steel, sheathed with teak, main deck of steel, and the poop, bridge and fore-castle decks are of teak. Large cargo ports are fitted in between decks opposite each hatch. A handsome saloon, with accommodation for 10 passengers, is elegantly fitted up under bridge deck. The captain is berthed in a large teak house on bridge, and officers, engineers, &c., are on bridge deck. Rooms for comrades are fitted up in poop aft. Engines of the triple-expansion type have been fitted by Messrs. the North-Eastern Marine Engineering Co., Limited, having cylinders 23 in., 36 in., and 59 in., by 42 in. stroke, supplied with steam from two large steel boilers, fitted with Howden's forced draught. The vessel has been built under the supervision of Mr. Buchanan and Mr. Duncan. A number of friends, including Mr. Cheyne, secretary to the Indo-China Steam Navigation Co., were on board during the trial trip, which passed off most satisfactorily.

**Penarth and Bertholey.**—On January 3rd the steamers *Penarth* and *Bertholey* had their trial trips in the Bay off Hartlepool. The vessels have been built by Messrs. William Gray & Co., Limited, for Messrs. Moral Bros. & Co., of Cardiff, and they are the fifth and sixth ships built and engined at Messrs. Gray's works for the same firm. They are both built to Lloyd's highest class. The dimensions of the *Penarth* are:—Length over all, 333 ft.; breadth, 41 ft.; depth, 24 ft. 10 in.; and of the *Bertholey*—Length, 310 ft.; breadth, 43 ft.; depth, 22 ft. 1½ in. The hulls are built with web frames, and there is a double bottom under each hold for water ballast. Tasteful saloons and state-rooms, together with captain's and officers' rooms, have been fitted. Triple-expansion engines have been supplied by the Central Marine Engine Works of Wm. Gray & Co., in the one case of 1,200 H.P., and in the other of 1,000 H.P. Three large main boilers, built of steel and working at 160 lbs. pressure per square inch, have been supplied, and this ample supply of steam enables the donkey boilers to be dispensed with, as one of the main boilers can be kept under steam for working the winches, windlass, &c. The vessels and their

machinery have been built under the superintendence of Mr. W. G. Moral and Mr. F. Good. The vessels left the dock at the same time, the party of inspecting engineers going out by tug, and after completing the trial of one, boarding the other. The engines were in each case run full speed ahead for an hour to test their capabilities, and the trials were in every way perfectly satisfactory, reversing from ahead to astern being done in four seconds, as is usual with these engines. The trials were witnessed by Mr. Good on behalf of the owners; Captain Murrell represented Messrs. Wm. Gray & Co.; Mr. T. Mudd, the engine builders. There were also present Mr. Kiah, of Messrs. J. & E. Kiah, of Sunderland, together with Mr. Metcalfe, their inspecting engineer; Mr. Percy Mudd, and others. The vessels were in command of Captains Morgan and West, and immediately on the conclusions of the trials the steamers left together for South Wales, to load their first cargoes, the *Penarth* for South America, and the *Bertholey* for the Mediterranean.

**Cambols.**—The powerful twin-screw hopper dredger *Cambols*, lately launched by Messrs. Fleming & Ferguson, Limited, Paisley, to the order of the Blyth Harbour Commissioners, has just completed on the Clyde a series of speed and dredging trials. The dimensions of the vessel are:—Length, between perpendiculars, 180 ft.; breadth, moulded, 35 ft.; depth, 14 ft. The vessel is constructed entirely of steel, has a hopper capacity of 600 tons, and is capable of dredging to a depth of 40 feet. She is fitted with power driven hopper winches for raising and lowering the hopper doors, triple-barrelled steam mooring winches at bow and stern, having all the necessary clutches, brakes, pawls, &c. She is also fitted with the builders' patent independent driven, automatic stopping, traversing gear, so that the buckets at the level of lower tumbler may be projected 2 ft. beyond the bow to enable the dredger to dredge its own way into banks and shoals. The traversing carriage wheels and main gear are entirely of cast steel. The wheels throughout are all of the same material; no cast iron gearing being used. Friction appliances are fitted to main dredging gear and also to the intermediate gearing in engine-room to prevent breakages from sudden and excessive strains. The main engines are of the compound surface-condensing type, capable of indicating 850 H.P. The bucket-ladder is raised and lowered by a powerful independent steam engine, driving a turned grooved barrel which receives the wire rope. The dredger is fitted with all the most modern appliances for vessels of this class. Steam reversing gear, sight feed lubricators, counters, governors, &c., are fitted to both engines, and steam-steering gear is arranged at after end of engine-room. The trials took place in the presence of Mr. J. Watt Sandeman, C.E., engineer to the Blyth Harbour Commissioners, and were highly satisfactory, the dredger having a good margin of speed and dredging power in excess of specification.

**Eastlands.**—On January 6th the new steamer *Eastlands*, recently built by Messrs. Ropner & Son, of Stockton-on-Tees, for Messrs. J. F. Wilson & Co., of West Hartlepool, left the Tees for her trial trip, having aboard Mr. J. F. Wilson, the managing owner; Mr. Maddison (under whose supervision the steamer has been built); and a large party of friends. After a satisfactory run the steamer was taken into West Hartlepool to receive her bunker coal to take her round to Maryport, where she will load for the River Plate.

**Chiswick.**—On January 17th the new steamer *Chiswick*, recently built by Messrs. Ropner & Son, of Stockton-on-Tees, to the order of the Britain Steamship Co., Limited, London, left the River Tees on her trial trip. This steamer has been built under the supervision of Mr. Spence, the inspector to the company, who was present during the trial trip, and who was highly pleased with the performance of the steamer and her machinery during the trial run. After the compasses were adjusted in the bay the steamer proceeded on her run to Cardiff, where she will load for a South American port.

**Sonnenburg.**—On January 17th the new steamer *Sonnenburg*, which has been built by Messrs. Wigham Richardson & Co., at their Neptune Works, to the order of the Deutsche Dampfschiffahrts Gesellschaft "Hansa," of Bremen, and specially constructed for the River Plate trade, went for a very successful trial trip. The engines are of the quadruple-expansion type. During the trial trip the machinery worked without the slightest hitch, giving satisfaction to all concerned, and the



vessel sailed at once to take her place in the service between Germany and the River Plate.

**Nanette.**—On Saturday, January 18th, the s.s. *Nanette* had her trial trip. The *Nanette* has been built by Messrs. William Gray & Co., Limited, for the Pyman Steamship Co., Limited, of West Hartlepool. She is a fine steel screw steamer, built to Lloyd's highest class, and her dimensions are:—Length, over all, 305 ft.; breadth, 42 ft.; and depth, 21 ft. 9 in. The deck erections consist of a full poop, bridge over machinery space, and topgallant forecastle. A handsome saloon and cabins for officers, &c., are fitted up aft, the engineers' rooms are in the bridge, and the crew's accommodation forward, including a bath-room for seamen and firemen. The hull is built on the web-frame system with a cellular double bottom, large hatchways, four steam winches, steam steering gear amidships, hand screw gear aft, two donkey boilers, patent direct steam windlass, boats on beams overhead, shifting boards throughout, stockless anchors, two masts with schooner rig, and a complete outfit for a first-class cargo vessel. The engines are of the triple-expansion type, and have been supplied by the Central Marine Engine Works of William Gray & Co. They have cylinders 22 in., 35 in., and 59 in. diameter, with a 39 in. piston stroke, and there are two large steel boilers working at a pressure of 160 lbs. per square inch. After adjustment of the compasses, the engines were put full speed ahead for about an hour, when the speed attained was found to be 11 knots, everything running perfectly well and giving great satisfaction to those on board. There were present Captain T. A. Pyman and Mr. Fred Smythe, representing the owners; Captain Murrell, representing the builders of the vessel; and Mr. T. Mudd, representing the Central Marine Engine Works. The vessel is in charge of Captain Clarke, and on the conclusion of the trial at once proceeded on her first run round to Garston, to load for the River Plate.

**Deike Rickmers.**—On January 18th the new steel screw steamer *Deike Rickmers* left the Wear for her trial trip. She has been built by Messrs. Priestman & Co., for the well-known firm of Messrs. Rickmers, Reismuhlen, Rhederei, & Schiffbau, A.G., Bremen, Germany, to Lloyd's highest class, and has a carrying capacity of 5,600 tons. She is a spar-decked steamer, with poop, bridge, and topgallant forecastle. When run over the measured mile a speed of 13.33 knots was attained, which was fully 1½ knots more than was expected, and therefore, most satisfactory. The dimensions of the *Deike Rickmers* are as follows:—Length, 362 ft.; breadth, extreme, 44 ft.; depth, moulded to spar deck, 28 ft. 9 in. The engines, which have been built by Messrs. William Allan & Co., are of the triple-expansion type, with cylinders, 23 in., 38 in., and 65 in. in diameter, by 42 in. stroke.

**Admiral.**—The Anchor Steam Fishing Co., Limited, of Grimsby (managers, Messrs. Letten Bros.), has lately received a fine addition to its fleet in the new steam trawler *Admiral*, constructed at Messrs. Cochrane & Cooper's yard at Beverley, engined by Earle's Shipbuilding Co., Limited, of Hull. The vessel was on January 22nd taken down the Humber for her official trial trip prior to being taken over from the contractors. The *Admiral* underwent the necessary tests with the greatest credit and satisfaction to both owners and builders. After her return she was berthed in the Fish Dock at Grimsby, and will shortly be despatched on her first voyage.

## Reviews.

*The Mechanical World Pocket Diary and Year Book for 1896.* London: The Mechanical World Office. 1895.

THE scope and contents of this volume are, perhaps, too well-known for us to recapitulate them at any great length. The usual information needed by the draughtsman, mechanic and engineer, are found embodied, and the book is to the mechanic especially a very efficient substitute for the more expensive volumes, which contains a vast amount of technical information which is very seldom needed. Here we find what is wanted in everyday work compressed into very small compass. The ninth annual is worthy to follow its successful predecessors. The chapter on boilers has been re-written and a good deal of new information introduced as to boiler chimneys, economisers, and such like matters. If we might make a suggestion for the next issue,

we would say that it would be well to introduce some information as to the water-tube boiler. The editor recognises its importance on page 72, but we have not been able to find any details as to its performance or construction. It may be that the Belleville, Yarrow, and such like boilers are too recent for much practical information as to their working to have leaked out or become tabulated. But we must remember that the water-tube boiler of the Babcock & Wilcox type is no recent innovation, and that it is largely used in land installations, both in this country and in America. On this point there is certainly room for a useful addition.

*The Gas Lighting Companies' Directory and Statistics for 1895.*  
*The Water Companies' Directory and Statistics for 1895.* London: Hazell, Watson & Viney, Limited. 1895.

THE nineteenth issue of these statistics and directories marks a new departure, which cannot fail to benefit both the giver and the receiver. In former issues, as those who have used the volumes or who have read our notices know, the gas and lighting matters were given together with the information regarding water companies. This is now altered. Lighting companies are in one volume, and water companies in another. This is as it should be. The price of the volume to one who is only concerned in one class of institutions is necessarily lightened, for he has not to pay for information for which he has no need. This cheapening cannot fail to very largely extend the circulation of the parts, whilst if any should be interested in having the whole range of information within the covers of a single volume he can still have his wish gratified, for the two parts can be had in a single binding. The difficulties of such a compilation as the present are well shown by the fact that one gentleman took a year and a week to fill up the form sent him! In spite of such inertness on the part of those who are at once the fountain whence the material for the volume must be drawn, and the ultimate users of the statistics it contains, the book seems to us to have a wonderfully complete amount of statistics regarding the various and numerous companies both at home and abroad. The summary of leading events during the year just past seems complete and is certainly interesting. The competition of the electric light accounts for much of the progress noted in the economy and efficiency in the supply and manufacture of gas.

*Ironclads in Action.* By H. W. Wilson. London: Sampson, Low and Co. 1896. 2 vols.

THE writer of a review of a book of this kind has a certain advantage when he is not writing for a daily paper. He has longer to work up the contents of the volume and he has the opportunity of reading some of the comments made by other reviewers. Events move quickly nowadays, and, as we take our pen on the shortest day in the year to discuss Mr. Wilson's book, we have points of interest in relation to naval warfare in the future in our mind's eye, and possible national complications before us which were undreamt of by anyone earlier in the week.

We have another advantage also. This is that we are able to take the opportunity, and are glad to have it, of expressing our sense of the taste and intention of some of the criticisms passed upon these volumes. We have all heard of the *odium theologicum*, and, it is supposed from the existence of the phrase, that the jealousy and spite of the theologian were exceptional things, peculiar to those who study the science of morality and who preach the doctrine of goodwill to our neighbours. But this is not the case. The *odium expertorum* is common to all scientific men, whether their science be theology or shipbuilding, and some of the critics of this work have let their judgments be sorely warped by the feeling that a young man has arisen who will take a foremost place amongst the naval experts of the day. His youth is to such men offence enough, but it is aggravated by the unpardonable sin of civility. A sense of being conspicuously inferior to the new writer fills the whole bitter cup to overflowing. Perhaps it were too much to expect generosity under such circumstances.

A true estimate of the value of Mr. Wilson's work will be most easily conveyed by the simple statement that the greatest naval writer of our day—we mean, of course, Captain Mahan, of the United States Navy—has written an introduction to the book. In his remarks this great writer dwells very forcibly and gravely upon the very high value of the lessons of experience. Ships and guns and armour are very different to what they were thirty or even twenty years ago, to say nothing of the change which has come since Nelson's time. Yet, as Captain

Mahan puts it, "There is such a thing as imbibing the spirit of a great master by the study of his actions, as well as the mere copying of his works. Nay, more: the salvation of a critical moment may come from such illumined knowledge of the past. Has not the great Napoleon, than whom none has more urgently studied and impressed the need of studying history, said, 'Upon the field of battle, the happiest inspiration is often only a recollection.'"

Captain Mahan sums up the position by his declaration that what navies now need is not so much further advance in material development, as more general and accurate knowledge of the results already obtained, an appreciation of the bearing of these results upon modern practice, and finally the application of this teaching of the past to the better knowledge of existing conditions. The task which Mr. Wilson has set himself to do is something wider and more comprehensive than the title of his two volumes would suggest. He has not merely written for us isolated accounts of the ironclads which have been constructed by the various powers and given us descriptions of the behaviour of these in action, as his title would imply. He has gone much further and given us a history of naval warfare since the ironclad became a factor to be reckoned with.

The period included in his view commences thirty years ago with the attack upon Kinburn during the Crimean War. This, however, is briefly dismissed, for the great Russian war was not a sailor's battle. The occasion when the ironclad first showed its importance was the American Civil War. On this account Mr. Wilson devotes a very large portion of his first volume to his discussion of this fratricidal conflict. At the moment of writing this War has to us a peculiar and dreadful significance. The air is full, not of Christmas bells, but of the talk of a possible conflict which would be as contrary to the kinship of nations as was that. The cause, however, is not the great question of freedom or independence which, as we view one side or the other, makes it in the minds of the combatants a glorious thing to make sacrifices for principle. To-day the question is not one of principle at all, but of electioneering. The possibility of war is, we trust, most remote. Yet we cannot help feeling that in some respects the position of the South was an example of what might be our own. True it is that we are never likely to be put to the straits that the South was in for such necessities of war as iron and gunpowder. But to them the command of the sea was absolutely vital, as it is to us to-day. Like the South we are not self contained, and our dependence on the sea is at once our weakness and our strength. The South had to send away cotton to pay for the instruments of war. We must rely upon the sea to give us our food and to give us our raw material and to keep the nation profitably employed. Whilst our Navy is strong we can fear no one. When it once falls a little below its proper strength we are at the world's mercy, and experience shows that the bluest sky may produce the most terrible thunderbolt.

The lessons on blockades running, commerce-destruction and protection afforded by the war are invaluable. So, too, is much that can be learnt from the naval engagements themselves. The conditions of fighting, however, have changed very greatly. The surprising thing thirty years ago was the small number of men that were sacrificed. The armour seemed to have absolutely and entirely beaten the guns. Nor should this be altogether remarkable, for the armour had been sprung almost as a surprise upon weapons which were rightly reckoned to cope with the wooden walls of the day. The big guns were big enough. There were plenty of 15 in. Dahlgren guns, but they did little execution. The reason is not far to seek. They were loaded very slowly, and fired infrequently. Their muzzle velocity was very low, and the armour was impenetrable by them. All that is now changed. Guns and explosives have been adapted to the new conditions, and the quick-firer has come to take the intermediate place between the big gun and the small arm. Never again, one would imagine, would a leadman have a chance to sling an enemy off the bows of a ramming ship.

The battle of *Lisa* is discussed with great care. The conclusion to be drawn from this battle is chiefly a personal one. The Austrian Commander-in-Chief was a man of determination, courage and resource. The Italian Admiral had none of these qualities, and accordingly his fleet never had a chance. The introduction of steam and of protective armour have, if anything, made the leader's personal magnetism and decision of character more necessary to success to-day than they were in the past.

The various struggles in which the vessels of the South American republics played their parts give the interest to the rest of the first volume, for neither the Turkish nor Franco-Prussian wars teach any great lesson which appeals to the ordinary mind. The famous contest between the Peruvian *Huascar* and the British warships *Shah* and *Amethyst* was a very indecisive affair. Mr. Wilson shows the explanation of this. The *Shah* was long, unhandy, of deep draught, and, above all, unarmoured. The *Huascar* was short, of light draught, handy, and, at long range at least, invulnerable. She could always keep in shoal water out of reach of the *Shah*. The latter had before her eyes the fear of being rammed, whilst she feared a close range with her want of protection. The *Shah* had, however, the advantage in speed, and it was that that enabled her to come out without damage.

The bombardment of Alexandria is an exploit of a kind not altogether likely to be repeated in a future war with a foe of equal civilisation. As against ships forts can be made impregnable. Considerations of weight and space do not limit the land battery like the ship. Ships will, of course, be engaged with forts, but the tactics of Port Arthur will replace those of Alexandria and Algiers.

From the account of the sinking of the *Blanco Encalada* we are reminded that this feat was one of a kind never likely to be successfully repeated with an European combatant. Not only were the torpedo nets not down but the launches were not patrolling, nor is it certain that the captain himself was on board. And all this, in spite of the fact that there was warning that such an attempt might be expected. We know that many of the crew were on shore, that a large part of the complement was raw, and from all these circumstances we may infer that the discipline was not very strict. Men hurriedly beaten to quarters by a call that did not convey the urgency of the need were not likely to make the most of the small opportunities that were given them of stopping the enemy's approach with their quick-firers. Even the fact that the vessel sank so rapidly after she was at last torpedoed is made less striking by the suggestion that the order to close her watertight doors was not carried out. But here as in the Chino-Japanese engagements, we see that the moral effect of a torpedo attack is not its least formidable part.

The experience of the *Aquidaban* in the Brazilian war quite support the explanations of the torpedoing of the *Blanco Encalada*. It is a moot point, however, as to what armament the Brazilian ironclad carried. Some authorities credited her with medium quick-firers. Others do not, and if she had nothing larger than her one-inch Nordenfeldts there is every reason why she might fail, in the conditions in which she found herself, in beating off her assailants.

The discussion of the Chino-Japanese War simply emphasizes the lessons we have already drawn therefrom. The immense value of quick-firers, the staying power of the battleship, and the importance of brilliancy in the command of the fleet in action, are brought home once more. The torpedo does not yet seem to have justified its reputation, though we see that its construction is improving and its tractability increasing. The danger of a superfluity of wood work has been realised by most Admiralties, and steps to diminish it as far as possible are being taken. The danger of thin plating, which only bursts shells and does not refuse them admittance, had been discovered at an early stage of ironclad development. The *Yalu* only emphasized that.

The chapters on the disasters to ironclads are instructive. With one or two exceptions the accidents are such that the heading might almost have been "the danger of the ram." A very doubtful aid in battle, save as a means of giving a *coup de grace* to a disabled foe, who might just as easily be despatched by any other of the victor's means of offence, it is certain that in time of peace it is a fatal danger to the comrade in the line. Besides these Mr. Wilson cites two other causes of disaster. One, as seen in the loss of the *Captain*, is the rigging with sails a vessel which should rely entirely on her steam. We, at least, have taken that dearly-bought lesson to heart. The other is the loss of the *Reina Regente*, which we can only attribute to the fact that, like too many other Naval Boards, the Spaniards had tried to put more into the ship than she could carry in the exceptionally bad weather she had to face.

We have already reached the limit of space allowed us, even for the examination of a work of the present importance. Yet the chapters on the development of the battleship and that on the Naval battle of to-morrow, are unnoticed. The former matter is dealt with historically and diagrammatically with

the discriminating ability which Mr. Wilson shows throughout. The other chapter is on a subject upon which Mr. Wilson, like all other writers upon these matters, apparently feels bound to express an opinion. Whether he be right or wrong in his view of what will happen in the next great Naval engagement, I trust we may never know. All that can be certain is this, that the carnage will be terrific, and that war nowadays is not a thing to be lightly regarded amongst civilised powers.

The book is full of excellent illustrations of modern and famous ships and weapons. There are many very excellent plans and diagrams, and by means of these ample assistance is afforded to the following out the course of action in important engagements. There are three indices, containing, separately, names of engagements, proper names mentioned, and a general index. There is an excellent bibliography on the subject of which Mr. Wilson treats, and he is always most careful to acknowledge the sources of his information. One or two appendices and many tables of ironclads, guns and torpedo engagements complete the volume.

Mr. Wilson's style is very pleasing and concise. Marine engineers will notice one expression which struck us as curious. It occurs at least twice in the book. It is the word "foaming" used in place of what we should call "priming." But the intention is very obvious.

In conclusion we may say that Mr. Wilson has devoted a vast amount of labour to the compilation of these volumes and he may be proud indeed of the results of his work. He brings together the history hitherto so scattered and yet so important. That the work is valuable follows as a matter of course, and in these days of wars and rumours of wars it is well that Englishmen should have laid before them all facts which bear historically or presently on the command of the sea and on the means at our hand for retaining the possession of our splendid and most vital heritage.

#### The Literature of Photography

We have received from Messrs. Percy Lund & Co., of Ludgate Circus, half a dozen publications on this deservedly popular subject. Of these there are three very handy and useful volumes from the Junior Photographer Series. They deal with three matters of very great importance to the modern amateur. There is one dealing with the *Camera and its Appurtenances*. Here the amateur learns what his necessary appliances ought to be and what style of instrument will best suit his pocket and his aim. The points to be observed when making a choice are all carefully explained and the merits of various well-known makes of camera are discussed. Another volume deals with *Snap-Shot Photography*, which is now so largely indulged in, and we are not surprised to see that already the first edition of the book on this topic is exhausted. It is illustrated with some excellent reproductions of the snap-shots taken in Wales and Shropshire by Mr. Martin J. Harding, ex-president of the Shropshire Camera Club. Now-a-days the amateur photographer who does a little globe-trotting generally wishes to lecture on his experiences and to give illustrations of what he has seen by means of the oxy-hydrogen light. Thus the *Making of Magic Lantern Slides* is a matter of great interest and importance to him. and Mr. J. Pike's clear exposition of the best method of doing this will certainly be widely appreciated.

*Burton's Illustrated Manual of Photography* is a useful book and one that will bear close study at the hands of the beginner, and even of him who has been accustomed to rely on the principle of "pressing the button" and leaving the optician and professional photographer "to do the rest for him."

The *Junior Photographer* Summer Number appears as the *Junior Salon*, and a most interesting collection of pictures taken by the subscribers are given. The answers to correspondents in this number, give some idea of the value of the journal to its readers and of the extent to which they appreciate the information afforded and trouble taken on their behalf. This magazine and its compeer, the *Practical Photographer*, give ample proof, if proof were needed at this stage of the development of the art, that it is an art, and one of a very delicate kind and that, for refinement of treatment and for minuteness of execution, the camera presses the older forms of reproduction very closely, whilst it has, at the same time, strong points where its elder rivals cannot hope to follow it.

## Correspondence.

[It must be understood that, in giving insertion to communications under this heading, we do not in any way pledge ourselves to the opinions preferred therein. We will with pleasure insert any letters likely to benefit our readers, either from their intrinsic value or as being calculated to promote such discussion as will elicit facts valuable from their being the result of practical experience.—Ed. M. E.]

### BULL'S METAL STEAM PINNACE.

To the Editor of THE MARINE ENGINEER.

DEAR SIR,—Referring to your interesting notice of the Pinnacle that we have recently built for Messrs. Siemens Bros.' cable ship *Faraday*, which is to accompany the cable-laying expedition up the river Amazon, we notice that accidentally the figures relating to the beam of the boat have been transposed. They are 7 ft. 8 in., not 3 ft. 7 in. The dimensions are: length 37 ft. 6 in., beam 7 ft. 8 in., and depth 3 ft. 10 in.

Hoping you will be able to find space for this correction which, perhaps, is sufficiently obvious.

We are,

Yours faithfully,

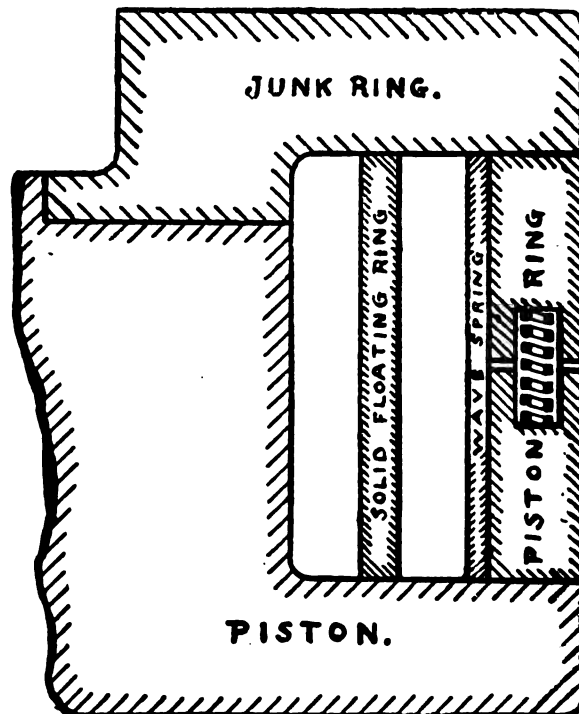
G. F. G. DESVIGNES & Co., LIMITED.

January 6th, 1896.

### PISTONS.

To the Editor of THE MARINE ENGINEER.

SIR,—On page 346 of your December issue, you illustrate a piston to which you refer on the previous page as Mr. Mudd's piston.



From tracing herewith you will note that such pistons have been made in our works for over ten years.

Yours faithfully,

J. CRAN & Co.

Per J. STEVENSON.

Leith, December 28th, 1895.

The Science and Art Department has received through the Foreign Office a communication stating that an International Exhibition will be held in Brussels in 1897.

## Miscellaneous.

**The Late Dr. Denny.**—The inventory of the personal estate of the late Dr. Denny, shipbuilder, Dumbarton, has been recorded at £190,979 14s. Consequent upon his death several changes have been made in the partnership of the firms. In the case of Messrs. William Denny & Brothers, shipbuilders, Mr. Leslie, youngest son of the late Dr. Denny, and Mr. Henry William Brock, son of Mr. Walter Brock, have become partners. Colonel Denny, M.P., Mr. Archibald Denny, and Mr. John Ward have been assumed as partners in the firm of Messrs. Denny & Co., engineers.

**The "Vestkysten."**—The new salvage and tug steamer *Vestkysten*, built at the yards of the Elsinore Iron Shipbuilding Co., to drawings by the Constructor at the Royal Dockyard, Copenhagen, and to be stationed at the Thyborøn canal on the west coast of Jutland, has lately been delivered to the Danish Ministry for the Interior. It is built entirely of steel to Bureau Veritas highest class, is 100 ft. long, and 20 ft. 7 in. broad. The engines are of the triple-expansion type, capable of indicating 385 H.P., giving a speed of 11.8 knots.

**Institute of Marine Engineers.**—The Annual Meeting of members will be held at the Institute's premises, 58, Romford Road, Stratford, on Friday evening, March 13th, at 7 p.m., when, *inter alia*, the annual election of office bearers and members of the council will be proceeded with, and on this occasion it is hoped there will be a full attendance of members.

**Smart Work in Engineering.**—If shipowning is not a remunerative business in these days, it is certainly not for the lack of capacity and enterprise on the part of our leading engineering firms who cater for the requirements of steamships. Owing to the extraordinary advance that has been made in appliances, methods of working, and possibilities of transit, feats are now accomplished which would have been utterly impossible of achievement even in the last decade, and which are significantly illustrative of the resource and readiness, as well as the honourable desire for distinction, which characterise our engineering experts at the present day. At the works of Messrs. John Dickinson & Sons, Limited, Sunderland, some instances of quick despatch have occurred lately, which are well worthy of record. At noon on Wednesday, the 18th of December, the firm received an order for a thrust shaft to weigh 3 tons, for the s.s. *Lady Salisbury*, then lying at Falmouth. The shaft, which was forged at the Sunderland Forge, was turned, finished, and bolted together—complete in two pieces—and was delivered at Falmouth at noon on the following Saturday. In the same month an order was received on a Thursday at 5 p.m., for a tail end shaft to weigh 3 tons 10 cwt., to be supplied to the s.s. *Tyr*. This was taken in hand at once, and was delivered to the steamer at Bergen, Norway, at midnight on the following Sunday. A third instance, not less astonishing than those mentioned, occurred during the present month (January). At 5.30 p.m. on the 10th, an order was received for a crank shaft (Dickinson's Patent) for the s.s. *James Cameron*, belonging to Mr. Westoll, of Sunderland. This was delivered coupled and fitted complete within a few hours, and the vessel sailed next day. It is no more than right to add that these remarkable instances of prompt execution and despatch are in the highest degree creditable to all concerned in the turning out of the work.

## Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from December 11th, 1895, to January 15th, 1896.

- 23667 B. Leslie. Raising ships' boats.
- 23671 E. Edwards (The Sixix Mariners' Compass Co., United States). Compasses.
- 23693 G. W. Tennant. Night signalling of vessels.
- 23699 A. L. Thorn and J. Globe. Furnaces.
- 23704 A. J. Boulton (The Boiler Capsule and Casket Co., United States). Method of cleaning the condensing surfaces of steam engine condensers, &c.
- 23717 P. J. Wilson and W. E. Wright. Steam relief valves.
- 23719 J. Batey. Steam boilers.

- 23727 B. Robinson. Method of lubricating.
- 23740 A. M. Thompson and W. W. G. Webb. Motors.
- 23745 R. Welford. Construction of ships.
- 23753 F. W. Golby (E. Mann, Russia). Lubricating.
- 23767 A. E. Hogue. Steam boilers.
- 23778 I. F. Kahn-Viollet and J. G. Fox. Furnaces.
- 23794 J. Butterworth and R. F. O. Tonge. Steam traps.
- 23808 E. Griffiths. Shaft bearings.
- 23809 M. Sibbring. Wash boiler fire-doors.
- 23888 J. Piendl. Boat.
- 23841 H. G. Brain. Ship's log.
- 23844 E. Shore. Mooring swivels for lighthips.
- 23845 J. Donaldson and W. O. A. Lowe. Boilers.
- 23861 G. C. Marks (A. Montupel, France). Steam generators.
- 23893 S. H. Lloyd. Steam generator.
- 23920 B. M. Fletcher. Utilising the power of sea waves.
- 23946 O. Lindemann. Steam heating apparatus.
- 23971 D. Rushworth and I. M. Berry. Steam boiler.
- 23988 R. Smith. Water-tube boilers.
- 24036 K. Markel and N. J. Shook. Wrenches.
- 24041 C. T. Cayley and R. S. Courtman. Manufacturing end connecting boxes for tubular boilers.
- 24051 E. W. Batt and T. Gribble. Rings for pistons.
- 24065 D. B. Walker. Refrigerating the hold of vessels.
- 24102 G. H. Chappell. Raising sunken vessels.
- 24132 A. S. H. Richardson. Anchor or grapples for mooring.
- 24177 E. D. Meier. Water-tube steam generators.
- 24201 A. L. F. Bayle. Steam engine governors.
- 24214 E. Powell. Furnaces.
- 24260 A. B. Bennett. Steam engines.
- 24265 B. G. Radford. Rotary motors or pumps.
- 24266 S. Fox. Boiler furnaces or flues.
- 24268 J. F. R. Knobloch. Tidal motors.
- 24269 J. F. R. Knobloch. Tidal motors.
- 24295 W. Eaves. Steam generators.
- 24309 F. E. Shean. Raising sunken ships.
- 24322 J. C. S. McLay. Heat non-conducting coverings.
- 24324 T. Sheppardson. Composition for ships' bottoms.
- 24368 E. P. Martin and E. James. Handling of steel plates.
- 24407 C. Burgess. Steam rotary motor.
- 24411 C. T. Wordsworth, E. Wiseman and J. Holroyd. Motors.
- 24420 B. J. Maloney. Temperature in the holds of steamships.
- 24439 C. F. R. Thompson. Valve mechanism of steam engines.
- 24457 A. Harris. Feed-water filters.
- 24466 A. C. Miles and B. F. de Morgenstern. Indicators.
- 24470 C. W. Thompson. Valve mechanism for engines.
- 24476 F. Hamer. A new rotary steam engine.
- 24508 H. Eckardt. Regenerators for furnaces.
- 24510 R. Roger. Double-barrelled winches.
- 24515 J. D. Ellis and J. Nodder. Boiler furnaces.
- 24550 G. P. Grace. Reserving rotary engines.
- 24559 G. Iden. Engine cutters and tracers.
- 24563 J. Scott. Multitubular boiler efficiency.
- 24564 W. H. Parry and J. H. Powick. Covers for boilers.
- 24568 S. Naylor. New boiler or water-heater.
- 24598 W. Goodbrand. Feed-water heaters.
- 24610 J. A. Deport. Working armour-plated turrets.
- 24622 C. Mackintosh. Safety valve.
- 24625 E. J. Preston and A. T. Cornish. Valves.
- 24632 A. S. F. Robinson. Engine governors.
- 24636 J. E. Greaves. Preventing explosions in boilers.
- 24647 A. Sharp. Sailing yachts.
- 24656 L. Myers. Compasses.
- 24672 G. and J. Horrocks. Reducing valves.
- 24673 H. Wall. Cellular lifebuoy.
- 24697 W. Birrell. Feeding water to steam generators.
- 24724 W. C. and A. W. N. Burder and J. M. Newton. Water-tube boilers.
- 24751 J. S. Raworth. Steam engines.
- 24753 C. Sheppard. Steam engines.
- 24761 R. Haddan. (J. E. Whiting, India.) Diving bells.
- 24775 W. Munro. Steam generators.
- 24807 H. Florian and H. Schoklitsch. Mariner's compass.
- 24812 G. Defosse. Metallic breakwater or wave breaker.
- 24828 W. P. Thompson. (J. Pissinger, Germany). Water-gauge glasses.
- 24830 W. J. Roberts and J. R. Jones. Utilising tidal power.
- 24841 H. Lefevre. Separable boats.
- 24862 J. Donald. Construction of anchors.
- 24867 W. Cu hbertson. Boilers.

- 24868 W. Thomson and B. Kelvin. Recording instruments.  
 24899 N. Foley. Water-tube boilers.  
 24916 J. J. Tinker. Steam generators.  
 24917 W. D. Whyte. Mariner's compass.  
 24974 W. Swindell (E. Woods, South Africa). Engine governors.  
 25004 W. R. Lawson. Ship's rudder.  
 25012 S. W. Wardwell, jun. Wrenches.  
 25022 P. R. Jackson & Co., Limited, and J. S. Lewis. Self-oiling bearings.  
 25083 F. G. Hampson. Water-tube steam generators.  
 25051 W. Thomson, Baron Kelvin. Water and steam valves.  
 3 T. O. Smith. Keel for pleasure sailing vessels.  
 8 W. Harbinger. Metallic packing for pistons, &c.  
 97 L. W. Williams. Generation of steam.  
 100 A. D. Curling. Feed-water superheater.  
 123 J. Giers. Furnaces for the manufacture of steel.  
 142 J. Lee. Joints and packing for steam pipes.  
 164 J. W. Petavel. Means for construction of yachts.  
 167 J. B. Hirschman. Apparatus for propelling ships.  
 180 L. Bollman and L. Kohnberger. Turbines driven by steam.  
 187 J. Airey. Packing for pistons.  
 195 J. D. Cooper. Device for raising ships.  
 196 F. J. Sweeting. Construction of yachts, &c.  
 208 J. H. Neave. Covering of ships' bottoms.  
 214 G. Azzeroni. Screw propellers.  
 232 J. H. Palmer. Feed-water filter.  
 263 B. H. Radford. Steam generators.  
 331 J. Spy. Ships.  
 380 C. Ware. Furnace grates for marine boilers.  
 384 F. Levett. Reducing condensed steam, &c.  
 396 T. Andrews. Armour for warships, forts, &c.  
 400 J. J. Tinker. Steam generators.  
 401 J. Kirkman. Semi-metallic packing.  
 438 T. Potterton. A safety valve for boilers.  
 447 W. Jackson. Trawling.  
 469 W. K. Mackenzie and C. Chamberlain. Light ports for marine vessels.  
 467 W. L. Phillips and A. Gluck. Ships and other vessels.  
 468 C. G. Dixon-Johnson. Drop keels for sailing vessels.  
 530 W. Pilkington, C. T. Bishop, A. Brownaword, and A. Pilkington. Seamless metallic tubes.  
 571 J. Dewrance. Bearings.  
 604 S. W. Baynes. Insulated anchoring apparatus.  
 617 F. H. Snyder. Covering ships' bottoms.  
 641 E. S. Richards. Application of fuel to furnaces.  
 685 E. Entwistle, sen. Metal tubular roller.  
 693 J. N. Layton. Life-belts.  
 717 N. Gherasimoff. Hauling boats on rivers, &c.  
 764 P. F. Maccallum. Ship construction.  
 767 F. O. Prince and The Setay Motor Engine Syndicate, Limited. Internal combustion motors.  
 784 P. Burt. Internal combustion motor engines.  
 848 J. I. and J. E. Thornycroft. Steam traps.  
 862 T. Bamford and W. Wadsworth. Light-feed lubricators.  
 891 J. Brown & Co., and J. Nodder. Boiler furnaces.  
 892 J. Brown & Co., and J. Nodder. Boiler furnaces.  
 929 J. Menzies. Piston rings.  
 968 F. W. Jones. Ships driven by motive power.  
 998 E. Buchholz. Compasses.  
 1000 W. M. Walter. Derricks and cranes.  
 1028 A. Logan. Disengaging gear for ships' boats.  
 1041 W. Reeves and The Reeves Patent Filters Co. Filters.  
 1058 A. J. Boulton (F. Deshoulières, France). Marine sounding instruments.

### BOARD OF TRADE EXAMINATIONS.

NOTE.—1C denotes First Class; 2C, Second Class.

December 21st, 1895.  
 Adams, W. .... 1C Glasgow  
 Anderson, D. R. 1C Dundee  
 Angell, G. .... 2C London  
 Archer, W. .... 2C Dundee  
 Bell, A. .... 2C Glasgow  
 Black, D. .... 2C "

Brian, A. J. .... 1C London  
 Campbell, J. E. 2C  
 Carmichael, W. 1C N. Shields  
 Cunningham, J. 2C London  
 Dalton, W. .... 2C  
 Danzelman, W. 1C  
 Donald, F. .... 1C Dundee

Douglas, A. .... 2C Glasgow  
 Edgar, W. .... 2C  
 Edwards, R. H. 2C Cardiff  
 Galloway, G. W. 1C Glasgow  
 Gibbs, F. A. .... 1C Cardiff  
 Gray, J. S. M. .... 1C Glasgow  
 Gregson, L. .... 2C Cardiff  
 Greenwood, S. 2C Aberdeen  
 Hargreaves, S. 1C Cardiff  
 Hutton, W. .... 1C Aberdeen  
 Jeffrey, J. S. .... 1C Hull  
 Jones, R. .... 2C Cardiff  
 Kraft, J. D. .... 2C N. Shields  
 Lamb, G. .... 1C Cardiff  
 Landen, W. H. 2C London  
 Leisk, D. C. .... 2C Aberdeen  
 Lindsay, David 1C S'th'pton  
 Little, W. .... 1C N. Shields  
 Mackenzie, K. .... 1C Cardiff  
 Malcolm, D. L. 2C London  
 McHarg, J. .... 2C Glasgow  
 McLean, J. .... 2C  
 McMillan, N. .... 2C  
 Morris, G. .... 2C Cardiff  
 Muir, J. M. .... 1C Liverpool  
 Oliver, J. .... 1C  
 Parker, J. .... 1C Glasgow  
 Patterson, G. .... 1C Liverpool  
 Perry, J. H. .... 2C London  
 Rice, E. .... 1C Cardiff  
 Richardson, G. 2C N. Shields  
 Roberts, J. H. 2C Cardiff  
 Robinson, A. M. 2C Hull  
 Scotland, J. .... 1C Glasgow  
 Shields, J. .... 1C  
 Siddell, J. T. .... 1C Liverpool  
 Sinclair, A. .... 1C Glasgow  
 Singleton, W. .... 2C Hull  
 Steele, A. .... 1C Glasgow  
 Sutherland, T. .... 1C Liverpool  
 Templeton, J. .... 2C Glasgow  
 Thomson, A. .... 2C Aberdeen  
 Turner, W. .... 2C London  
 Valentines, J. .... 2C Aberdeen  
 Valler, C. H. .... 2C N. Shields  
 Ward, H. .... 2C  
 Wheat, F. O. 2C  
 White, D. .... 1C Glasgow

December 28th, 1895.

Andrews, J. D. .... 2C London  
 Beattie, R. G. .... 1C  
 Blackett, J. S. .... 2C  
 Cameron, W. H. 1C S'derland  
 Carnegie, J. D. 2C  
 Carr, T. R. .... 2C  
 Cass, J. F. .... 2C N. Shields  
 Chappell, A. .... 2C S'derland  
 Davies, H. L. .... 2C London  
 Duncan, J. .... 1C N. Shields  
 Frater, T. S. .... 1C London  
 Johnston, R. L. 1C  
 Ligertwood, E. 2C N. Shields  
 Loveridge, F. C. 2C  
 Milburn, G. R. 1C London  
 Moore, G. W. .... 1C  
 Muir, J. .... 1C Liverpool  
 Oliver, J. .... 1C  
 Patterson, G. .... 1C  
 Rainey, D. L. .... 2C London  
 Siddall, J. T. .... 1C Liverpool  
 Sutherland, .... 1C  
 Timms, P. G. .... 2C London  
 Tonkyn, E. .... 2C S'derland

Wilkins, D. W. .... 1C London  
 Witten, G. .... 2C S'derland  
 Young, T. .... 1C N. Shields

January 4th, 1896.

Bell, P. .... 1C Glasgow  
 Blackie, T. .... 2C Liverpool  
 Callus, H. J. .... 1C Cardiff  
 Gibb, W. .... 2C Liverpool  
 Hamilton, T. .... 2C Glasgow  
 Howitt, J. .... 1C  
 Hughes, Evan. 2C Liverpool  
 Kinning, A. C. C. 1C  
 Mason, R. W. .... 2C Glasgow  
 M'Farlane, R. .... 1C  
 M'Murray, D. .... 1C  
 Osborne, M. .... 2C Liverpool  
 Parry, C. .... 1C  
 Preston, J. .... 2C Glasgow  
 Rawthorne, G. 2C Liverpool  
 Rode, G. L. .... 2C Glasgow  
 Tracey, J. A. .... 2C Liverpool  
 West, Macdonald 2C  
 Yuill, J. .... 2C Glasgow

January 11th, 1896.

Atkinson, W. G. 1C Liverpool  
 Baird, J. .... 2C London  
 Campbell, A. .... 2C  
 Campbell, R. .... 2C Liverpool  
 Capey, T. H. .... 2C  
 Drinkwater, G. 1C  
 Irwin, J. .... 2C  
 Payne, L. F. .... 2C  
 Rendall, J. G. .... 1C London  
 Wadsworth, A. 2C Hull  
 Whitson, C. .... 2C London

January 18th, 1896.

Amery, J. .... 2C London  
 Anderson, W. T. 1C Liverpool  
 Barr, M. .... 2C Greenock  
 Bates, C. .... 1C N. Shields  
 Caie, G. .... 2C London  
 Charleson, A. B. 2C Leith  
 Denholm, G. .... 2C Greenock  
 Doherty, M. .... 2C London  
 Eason, J. .... 2C Leith  
 French, J. H. .... 1C London  
 Handy, R. F. .... 1C N. Shields  
 Harrison, J. .... 1C  
 Irvin, G. W. .... 2C  
 Johnson, C. H. 2C Liverpool  
 King, C. G. .... 2C London  
 MacKay, R. .... 2C Leith  
 MacLaren, C. .... 2C Greenock  
 McDowall, J. .... 1C Leith  
 McKellar, J. .... 1C Greenock  
 Milburn, I. D. 1C N. Shields  
 Morton, W. .... 2C Leith  
 Ord, W. .... 1C N. Shields  
 Patterson, W. .... 2C London  
 Pettifor, E. .... 1C N. Shields  
 Pollock, J. .... 2C Greenock  
 Sharman, J. H. 1C London  
 Sibbald, T. K. 1C  
 Simpson, A. M. 2C Leith  
 Sinclair, A. J. 1C London  
 Soltau, A. C. .... 2C  
 Toplis, W. W. 1C Liverpool  
 Walker, J. .... 2C Greenock  
 Ward, F. C. .... 1C N. Shields  
 Young, W. .... 1C Greenock

**Contract for a Paddle Steamer.**—Messrs. John Penn & Sons, Limited, Greenwich, have received from the Devon Steamship Co., Limited, an order for a paddle-wheel passenger steamer for Exmouth of 500 I.H.P. Messrs. Penn have placed the contract for the hull with Messrs. R. & H. Green, Limited, of Blackwall.



# The Marine Engineer.

LONDON, MARCH 1, 1896.

MUCH interest is being taken in this country as to the machinery and details of the new American liners *St. Louis* and *St. Paul*, made by Messrs. Cramp, and in the performances generally of these boats. We have much pleasure, therefore, in giving our readers elsewhere full illustrations and details of the engines and boilers of these vessels, which, as far as workmanship, massiveness, and ingenuity of arrangement, are equal to anything turned out by the leading firms of this country. In fact, in the matter of ingenuity of arrangement, the engines of the *St. Louis* and *St. Paul* are unique, as they are arranged upon an unusual plan, which we understand has been patented by Mr. John Thom, who is associated with the technical staff of the American Line as a consulting engineer. The engines are of the quadruple-expansion type, but arranged peculiarly as regards the main crank shaft, probably with a view of best distribution of pressure over the various cranks. There are two twin high-pressure cylinders of 28½ in. diameter which are arranged above and in tandem with the two twin final low-pressure cylinders of 77 in. diameter in each engine at the forward end, but the high-pressure cylinders do not exhaust direct into the low-pressure cylinders in tandem with them, but into a first intermediate cylinder of 55 in. diameter, upon a third crank and situated on the same lower tier as the final low-pressure cylinders. From this first intermediate cylinder the expansion or exhaust is into a second intermediate cylinder of 77 in. in diameter on a fourth crank, and finally the steam is passed from the second intermediate cylinder back to the two low-pressure cylinders of 77 in. diameter each, under the high-pressure cylinders, the strokes being all the same, viz., 5 ft. This arrangement gives a proportional increase of volume of approximately double, as the steam is transferred from cylinders to cylinders, viz., contents of two 28½ in. cylinders to one 55 in. cylinder, thence from 55 in. cylinder to a 77 in. cylinder, and thence again to two 77 in. cylinders, whilst the final low-pressure cylinder, from being divided into two, is less bulky than a single cylinder with the same expansion of volume, and similarly the high-pressure cylinders, by being divided, distribute the pressure when at the high initial point of 200 lbs. per square inch, better than if contained in one cylinder only operating on one crank. Against this it may be urged that by the increase of the series of cylinders from four to six, by division of the high

and extreme low-pressure cylinders, the pistons, piston rings, piston gland packings, valves, and valve gears are multiplied, which may tend to increase the internal friction of the engines and reduce efficiency. The proportion also of external radiating surface, as compared with the weight of steam passing through the cylinders, is also greater in a six-cylinder engine to effect quadruple expansion in lieu of the simpler four cylinders that would suffice. The engineering community, therefore, will watch with interest the performance of these engines, to see how far efficiency and economy will warrant the specific arrangement as an advantageous novelty.

WITHOUT doubt the Budget announcement of the present Government will provide for an exceptional expenditure upon the British Navy. The mood of all classes would seem to be, now rather prepared to face an exceptional expenditure rather than an ordinary one for this purpose. We may regret in the abstract that the unruly passions of men and nations still render the possibility of war between apparent friends or even relatives, an eventuality that may be faced. And it is now generally acknowledged that the best preventative of such possibility is to be amply prepared for it. Such expenditure must be considered as a premium of insurance that has to be paid by the British Empire for its quiet and certain enjoyment of existence, dependent as that is for its very food and for all that makes life enjoyable, upon the undisputed control of the seas. Such supremacy as we now have, if it were doubled, would still be no menace to others, as we have little anywhere to seek or desire than quiet possession of that which we have. An expenditure upon the Navy though not what is termed a productive investment, must not be regarded, even by the taxpayers as an absolute loss to the nation in a political economy sense. Let the Admiralty without too cheese-paring economy distribute such work and contracts in such places scattered over the United Kingdom as may seem most urgently in need of a stimulus to their manufacturing energy and briskness, and the brighter prospects so engendered and the greater content and prosperity brought to the mass of labouring population and tradesmen in such districts, will in itself be no slight reward to the mass of taxpayers who have to find the wherewithal to pay the bills. It is a splendid reply to the rumours, and even threats of difficulties with which our Empire is at present surrounded, that we have not only a surplus of revenue to apply to the best mode of ensuring peace, but show ourselves ready as a nation to go further than that in finding the necessary financial support for an unmistakable policy of defence. It is to be hoped, however,

that the Admiralty, in giving executive effect to such a policy, will not be unwilling to do as the best commercial lines of steamships do, viz., give good prices for good and first-class work, from such firms as are

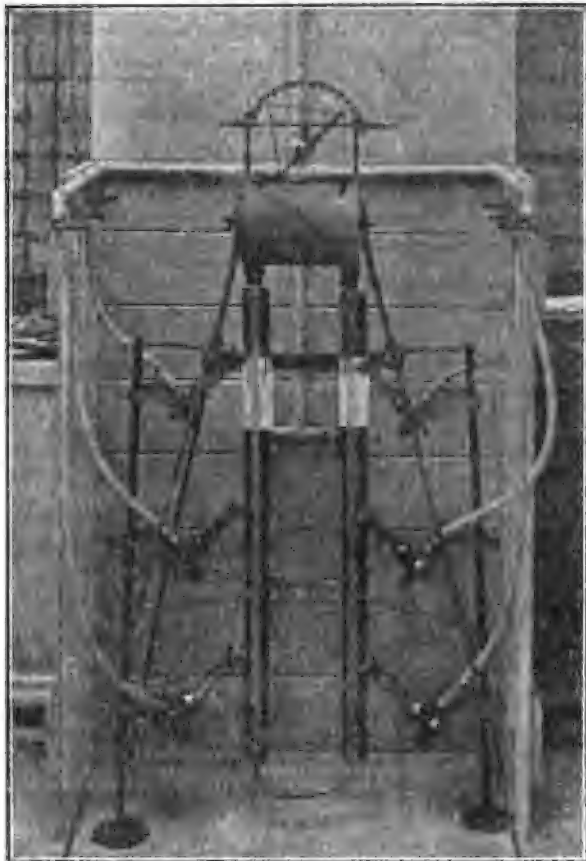


FIG. 1.

known to be capable and desirous of doing such work, and will regard the fair distribution of such contracts to the various ports and estuaries as an essential consideration in their position as the distribution of contracts paid for by the kingdom at large. It would be well, also, if the Admiralty as a public body, dealing only with trust funds as public servants, were to at least aim at a tone of commercial morality in their dealing with tenderers which would certainly be required from any commercial house that at all regarded its reputation for probity as important as getting good value for their money. Then, again, any increase of our fleet must entail corresponding increase of our *personnel* to man it. If the Admiralty is to call upon the nation at large to volunteer to man and engineer their enlarged fleet they must regard all capable men whose services they may require, whether as deck officers or as engineers, as gentlemen and brothers, or they may find an increase of vessels but white elephants for want of a sufficient supply of properly

qualified men to take up the vacancies. That there are plenty of such men available as regards their scientific and practical abilities is evidenced by the fact that the Admiralty rely upon such reserve supply in case of war. While it still is peace it is surely worth while to offer reasonable and proper inducements and consideration to such men as may make them willing volunteers, or vessels alone may be worthless.

### THE CIRCULATION OF WATER IN BOILERS.

IN our last issue we dealt generally in our editorial notes with the results obtained from numerous experiments carried out by Messrs. Yarrow & Co., with a view to throw light on the circulation of water-tube boilers, which Mr. Yarrow, in his usual generous and open-hearted manner, has placed at the disposal of the engineering profession at large. We are enabled in this issue to present our readers with a full description and complete set of illustrations dealing with these experiments, which we have had the pleasure of witnessing. The results of the experiments are not the actual results of the experiments as carried out when we were at the works, but are fair samples

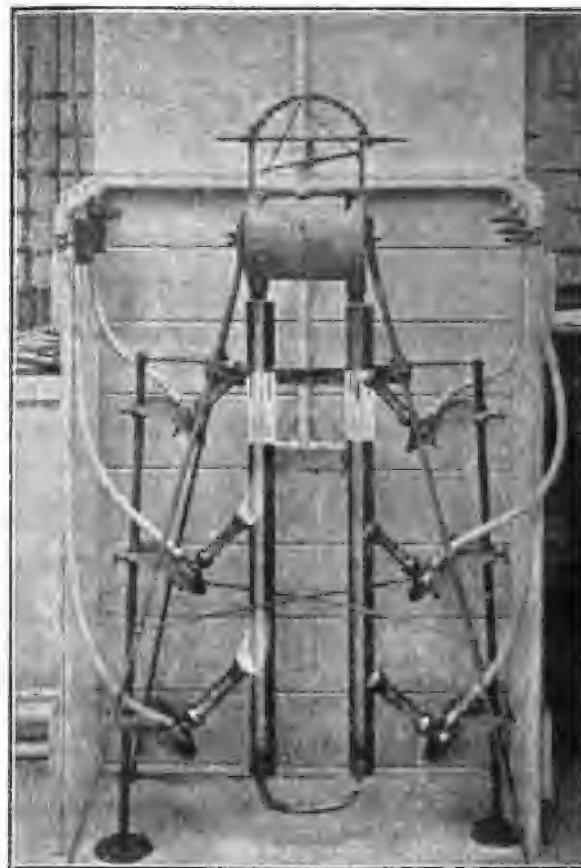


FIG. 2.

from a number of experiments which have been carried out by Mr. Yarrow and his staff.

One point which these experiments prove is that the heating of down tubes actually accelerates the circulation and does not retard it, as is generally believed.

The first experiment is illustrated by figs. 1, 2, 3, 4, 5 and

6, which represent the same model under different conditions. This model consists of two vertical glass tubes, attached to the bottom of a small tank, the tubes being united at their lower extremities by a copper bend. There are six Bunsen burners, three acting on each tube, and arranged so that they can be regulated at will. On the upper part of the model is a balance, one arm of which is suitably loaded, and from the other arm is, hung by a thread, a grooved ebony bob, which is suspended in the down-tube in such a manner that the water when flowing downwards, acting on the bob, causes it to descend, depressing the end of the balance to which it is attached. Fig. 1 represents the model in its normal condition, before any heat is applied; figs. 2 and 3 show the effect when two and three lamps respectively on the up tube are lit; and figs. 4, 5, and 6 illustrate the result when the three lamps on the down tube are lit in addition to the one, two, and three respectively acting on the up tube. This experiment does not indicate the speed of the current, but it shows very clearly any increase or decrease in the speed of the descending column of water, that is to say, the rapidity of the circulation.

When the pointer is vertical, it is at zero;

When it moves over towards the up-tube side the figures are indicated as minus;

When it moves towards the down tube the figures are indicated as plus.

The following are the results of carefully tried experiments:—

When no heat was applied, the pointer indicated —45, as represented in fig. 1.

When only one lamp was acting on the up tube, the current was too intermittent to record a reliable result.

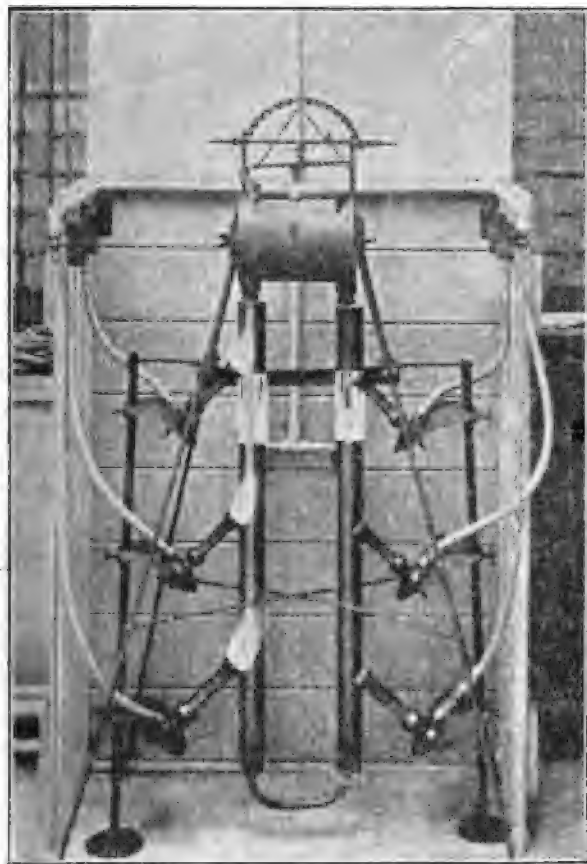


FIG. 3.

When two lamps were acting on the up tube, the pointer indicated —12, as represented in fig. 2.

When three lamps were acting on the up tube, the pointer indicated —5, as represented in fig. 3.

When three lamps were acting on the up tube and one on the down tube, the pointer indicated +10, as shown in fig. 4.

When three lamps were acting on the up tube and two on the down tube, the pointer indicated +15, as shown in fig. 5.

When three lamps were acting on each side, as shown in fig. 6, the pointer indicated +20.

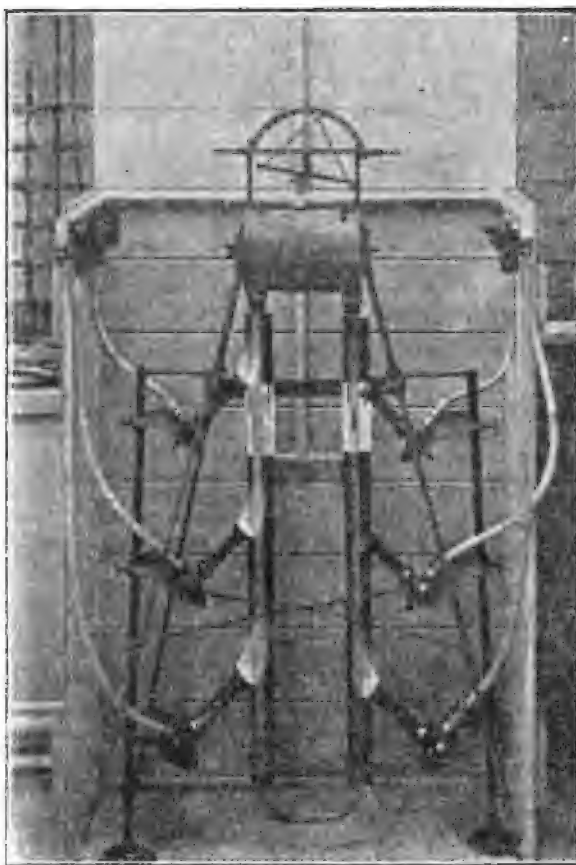


FIG. 4.

These experiments clearly prove that the circulation gradually increased as more and more heat was applied, irrespective of the proportion of the total heat absorbed by the up and by the down tube. Further experiments showed that, within certain limits, the rapidity of the circulation depended solely upon the total amount of heat applied, irrespective of how this heat was divided between the descending and ascending columns.

The second experiment is illustrated by a similar model shown in fig. 7. In the down tube is placed a small screw propeller, which, when revolving, actuates a vertical spindle, having at its upper end a worm, gearing into a small worm-wheel, as will be seen. This arrangement was made at the suggestion of Mr. Maxim, and it enables the speed of the current, under varying conditions, to be estimated.

When two lamps were acting on the up tube, the speed recorded by the propeller was found to be 23 ft. per minute.

When three lamps were acting on the up tube, the speed was 36 ft. per minute.

When three lamps were acting on the up tube and one on the down tube, the speed was found to be 42 ft. per minute.

When three lamps were acting on the up tube and two on the down tube, the speed was 49 ft. per minute.

When three lamps were acting on the up tube and three on the down tube, the speed was 55 ft. per minute.

These experiments confirm those previously described with the suspended bob, proving a gradual increase of speed in the circulating system as more and more heat was applied, irrespective of whether this heat was absorbed by the water in the up tube or by the water in the down tube. It should be remembered that, owing to the resistance offered to the flow of water by the screw, the actual speeds, if no screw had been there, would have been greater than those above recorded. In

addition to this, an allowance must be made for the slip of the screw.

It must be borne in mind that in all the foregoing experiments circulation must have been set up by heat being first

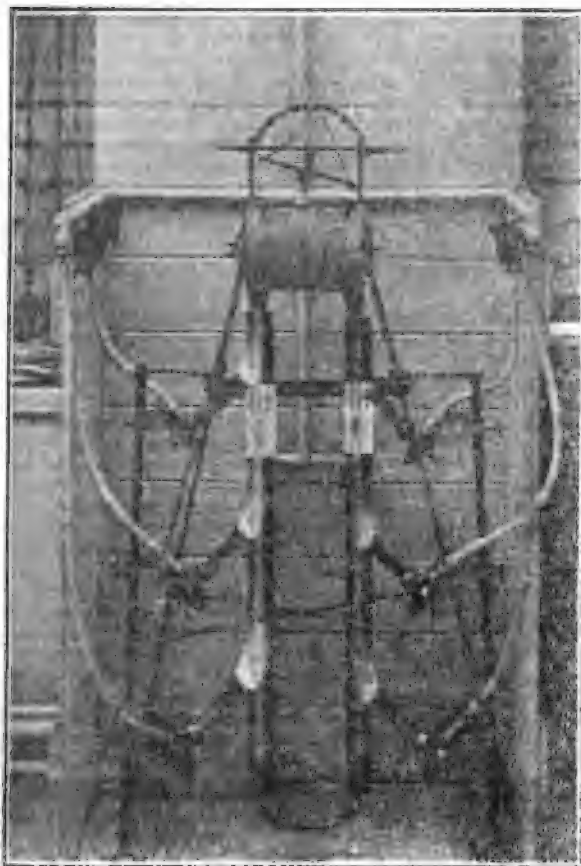


FIG. 5.

supplied to the up current, which in all water tube boilers is the case, those tubes nearest the fire being heated first, and thus circulation is established.

These experiments also illustrated what has not yet, we believe, been referred to, viz., that any bubbles of steam formed in a descending column rapidly disappear; and it is more than probable that in a down tube moderately heated no steam whatever is formed, because, as the current descends, the temperature of the water can rise without producing steam owing to the increased head of water and the higher temperature of the boiling point at the greater pressure. For example: under atmospheric pressure the water in the upper part of a tube would boil at  $212^{\circ}$ ; but the water in the lower part of the tube, if 4 ft. long, would boil at  $218\frac{1}{2}^{\circ}$ ; consequently the whole body of water can be raised from  $212^{\circ}$  to  $218^{\circ}$  while descending without producing any steam. This heat, thus absorbed, is given off by the conversion of a portion of the water into steam as the current ascends in the up tube. In the experiment the bubbles could be clearly seen forming where the flames impinged, and, as they descended, to disappear, the steam parting with its heat and raising the temperature of the surrounding water.

The third experiment was illustrated by a model consisting of two glass tubes, placed at a small angle to the horizontal, their upper ends being connected to a small cistern and their lower ends united, shown in fig. 8. The tube on one side was arranged to be heated by three Bunsen flames and the other tube also by three Bunsen flames of smaller size. When once the circulation was started in the up tube by the three larger flames, those acting on the down tube could also be lit and the circulation could be clearly seen to be accelerated.

The fourth experiment consisted of a cistern from the bottom of

which were led three tubes, the lower portions of which were of copper and the upper portions of glass, illustrated by fig. 9. The three copper tubes were united at their lower extremities, being secured to a horizontal chamber. They were all situated in a gas furnace, lined with asbestos, heat being applied directly to the tube on the one side by means of several multiple Bunsen burners, the flames from which passed across the other two tubes and up the funnel which is seen in the illustration. This experiment more nearly approaches the conditions of an ordinary Yarrow Water Tube Boiler, and it was seen that sometimes there were two down currents in the two cooler tubes, and one up current in the tube most heated, and at other times there were two up tubes and one down tube. In this model as much as 9 lbs. of water per square foot of heating surface was evaporated.

The fifth experiment consisted of two glass tubes projecting from a small tank, the tubes being nearly vertical, illustrated in figs. 10 and 11, being a front and side elevation of the apparatus respectively. These glass tubes were united to copper tubes, at the bottom of these was a T-piece, to which a third tube of copper was connected, the upper extremity of which was secured to the bottom of the tank. The two composite glass and copper tubes were in front and the copper tube was at the back, this latter representing an outside down pipe. Multiple Bunsen burners were provided for heating all three tubes. On heating the two front tubes an up current was established in both, the copper tube at the back serving as an outside down pipe, and the speed of the current could be seen by watching the flow of water and steam in the glass tubes

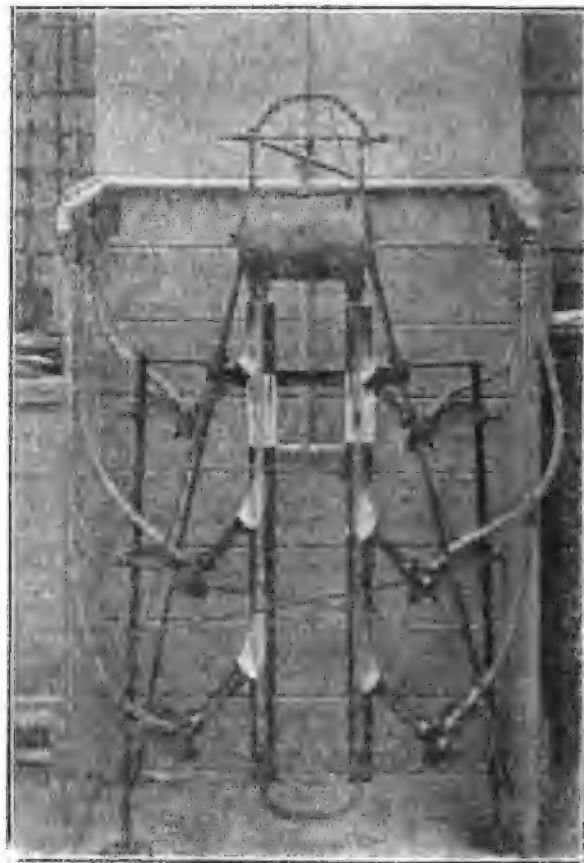


FIG. 6.

When heat was applied to the down corner at the back it was clearly evident that the circulation was accelerated.

The sixth experiment consisted of a small tank from which were led two inclined glass tubes, united at their lower extremities, illustrated in fig. 12. Provision was made to introduce a current of air from an air tank under pressure into either or both these tubes, as will be seen. When upward

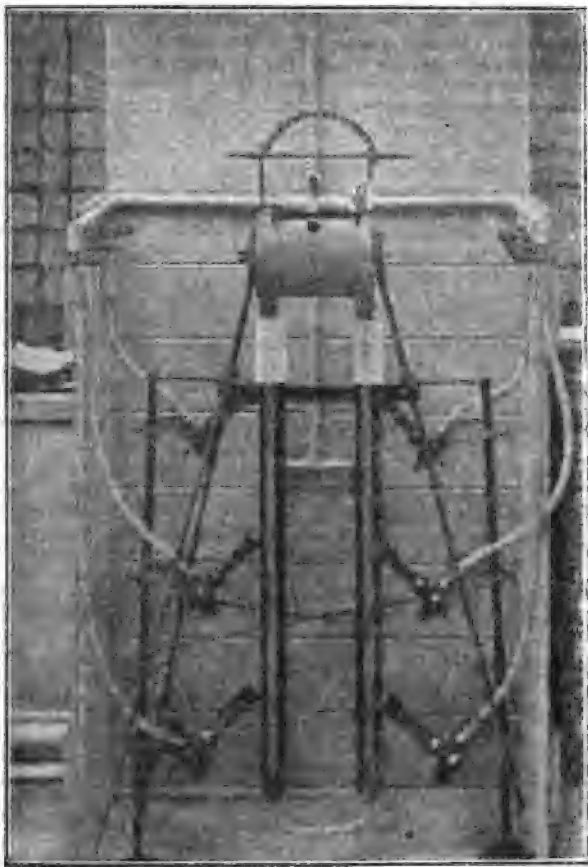


FIG. 7.

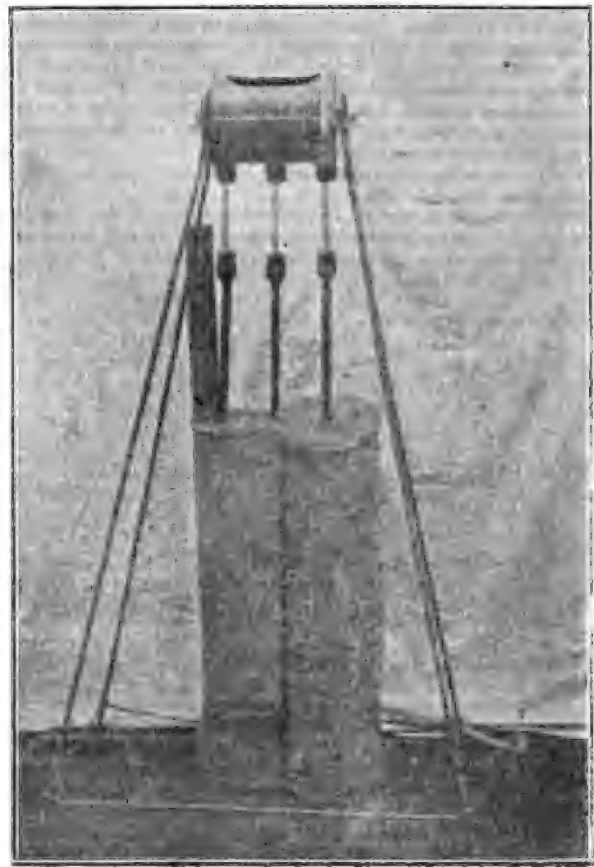


FIG. 9.

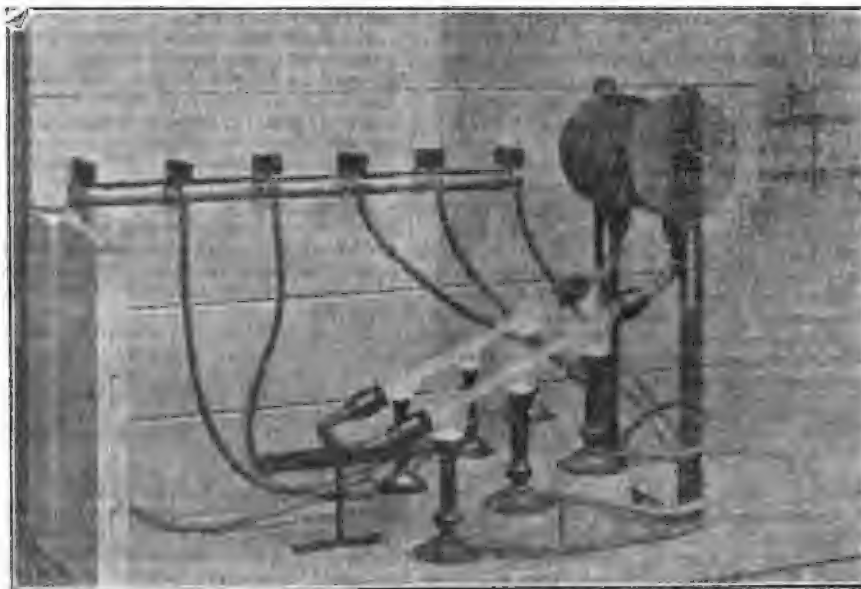


FIG. 8.



circulation had been established in the one tube, by introducing bubbles of air, then a further supply of air was admitted into the down tube, which air passed downwards with the water and then upwards in the up current, increasing the circulation, which was maintained even after the supply of air had been completely cut off from the tube containing the ascending column, the circulation continuing in the same direction, air only being admitted into the down tube.

All the foregoing experiments were made at atmospheric pressure.

The seventh experiment showed the action under a pressure of 150 lbs. per square inch. It will be seen that at the upper part of the model is a steam chest, to the bottom of which was attached a U tube, fitted with glass at its upper extremities, so as to render the circulation visible, illustrated in fig. 13. There were three small Bunsen lamps in connection with the one leg, and five large Bunsen lamps in connection with the other leg. It was found that if the circulation was once established by lighting the three small Bunsen flames on the one side, producing an up current on that side, then the five large flames on the down current might be started, increasing the circulation, which actually continued after the three flames in the up tube were all turned out. This extreme condition under which circulation can be maintained, we venture to say, is one which few engineers would believe possible, and confirms the views expressed by Professor Lambert and Mr. Maxim.

The eighth experiment was made on a full-size section of a water-tube boiler with straight tubes, working at a high pressure, illustrated in fig. 14. At one end there was a fur-



FIG. 10.

nace under forced draught by means of a jet in the funnel. The flame passed transversely across the group of tubes to the funnel, situated at the end opposite to the furnace. In the tube furthest removed from the furnace was placed a small screw propeller, and also a similar fitting in the third tube from the end, by which the direction of the current and its

minimum speed could be estimated. On raising steam and forcing the fire the propellers were seen to revolve in a direction indicating a steady down current in either one or both of the tubes in which the propellers were introduced,



FIG. 11.

previous experiments proving that a down current existed in the second tube from the end. It was found that there were never less than two down tubes in operation.

The ninth experiment represented also a full-size section of a water-tube boiler having straight tubes, heated in the same manner as in the former case, illustrated in fig. 15. The circulation was rendered visible by the upper part of the tubes being of glass. It could be clearly seen that an upward current was established in those tubes nearest the fire, water descending in those which were furthest removed from it, confirming the previous experiment.

It may here be remarked that the maximum evaporation obtained by Messrs. Yarrow & Co., when the circulation has been forced to a very high pitch, was 25 lbs. of water per square foot of heating surface, but this being an uneconomical amount of forcing, is far beyond the range of what is desirable in practice.

The seventh experiment clearly proved that circulation was more efficiently maintained at a high than at a low pressure, it being found that the extreme condition of maintaining circulation by applying heat only to the down pipe was never certain, except with pressures over 50 lbs. per square inch; between 30 lbs. and 50 lbs. this result was doubtful, and below 30 lbs. it was not possible.

The reason of this is probably due to the reduced velocity of the down current in the case of low pressures, owing to the greater bulk of a given weight of steam at low than at high pressures, all of which steam has to pass through the up tube; or in other words, there is less resistance to a given weight of water and steam at a high pressure flowing through a system of tubes than at a low pressure, on account of the lesser bulk of the water and steam in the former case.

The exact arrangement of the propellers in connection with No. 8 experiment is clearly seen by fig. 16, which shows a section through the steam chest and one of the tubes containing the propellers.

In order to obtain reliable data as regards the temperature of the tubes, which are exposed to the fiercest action of the fire, the following facts in connection with No. 8 experiment will be instructive, and to fully explain reference must be made to the section through the tube nearest the fire, as shown in fig. 17.

The lower end of a long rod was attached to the water chamber at the bottom, this rod passing up through the centre of the tube and thence through the top of the steam chest. At the upper end of this rod was a pointer and a similar pointer was affixed to the steam chest itself, as will be seen, the two pointers being exactly in a line with one another. Thus whatever difference in the relative lengths of the tube and the rod took place, it would be at once made evident by alterations in the position of the pointers in relation to one another. If thus the tube, owing to its being exposed to great heat, expanded more than the rod, it could at once be detected and any such increased relative length would be an indication of an increased relative temperature.

Now it was found that there was no visible difference in position between the two pointers, whether the fire was forced or extinguished, and as the rod passing up through the steam and water would have a temperature equal to that of the steam and water, it follows that the temperature of the tube is the same, or the difference, if any, is so trifling as not to be indicated by the means above described.

This experiment conclusively proves that, so long as there



FIG. 12.

is good circulation, no possible objection can exist to the adoption of straight tubes, as in a Yarrow boiler, owing to any imagined necessity to allow for variations in length, due to differences of temperature. For all practical purposes, the temperature of all the tubes may be considered the same as that of the water they contain, in the same manner as in

an ordinary marine or locomotive boiler, in which no special provision is made for differences in expansion of the tubes, although they are by no means all exposed to the same extent to the action of the heated gases. This experiment, which is



FIG. 13.

confirmed by practical experience in the use of the Yarrow boiler, points conclusively to the fact that the curving of tubes in water-tube boilers (having good circulation) for the sake of allowing for variations in length due to variation of temperature is quite unnecessary.

#### STEAM ENGINE MAKERS' SOCIETY.

THE introductory address of Mr. James Swift, the General Secretary of the Steam Engine Makers' Society, to the seventy-first annual report of this organisation, which has just been sent out to the members, contains a good deal of matter of special interest to our readers. Mr. Swift introduces his report with a general summary of the operations of the society during the past twelve months, and in these finds occasion to congratulate the members upon the very satisfactory results they were able to record at the close of 1895. During the year the number of admissions had exceeded those of any previous year, the total increase of members showed a like result, and the capital value of the society—notwithstanding several disputes and a heavier list of sickness than in any previous year—was a record that had not been attained before. With regard to the financial operations of the society, the income during the year had been £19,018, which, with a balance of £28,826 from 1894, made a gross total of £47,844 to be accounted for. The net expenditure had been £17,866, leaving a balance of £30,478, or an average of £4 6s. 1d. per member. The total membership at the close of the year was 7,085, and the number of branches 101, of which 98 are in the United Kingdom, one in the United States, one in Canada,

and one in Queensland. The net result of the year's working was a gain of two branches, 405 members, and £1,651 in capital; whilst the total income was £1,448 more than in 1894, this result being due partly to the increased membership, but

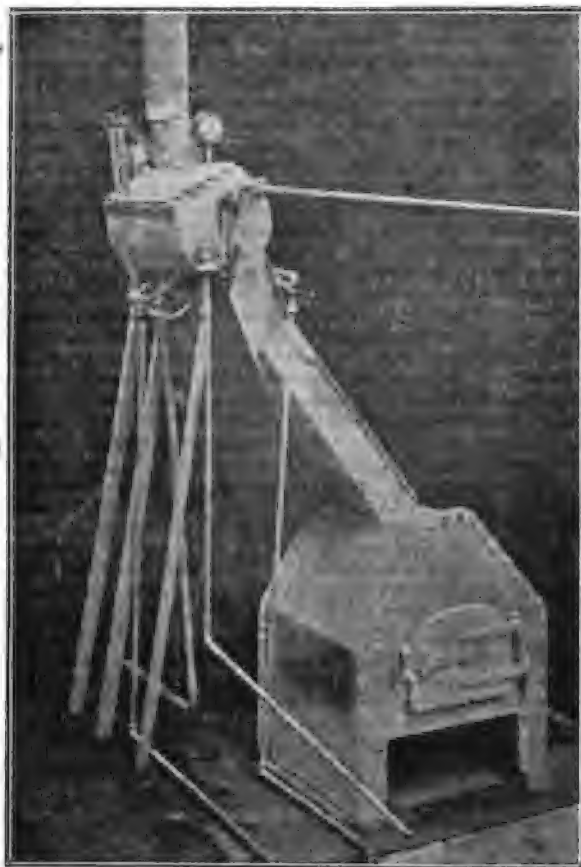


FIG. 14.

chiefly to the lessened number of unemployed. Turning to the expenditure, the most satisfactory feature was the reduction in the amount paid for donations to unemployed. In 1894, this was £8,250, or £1 4s. 8½d. per member, but last year only £6,009 was paid, representing 16s. 11½d. per member, thus showing a decrease of £2,240 when the two years were compared. Mr. Swift is sanguine that the present year will be even more satisfactory in this respect, and that, the average period of bad trade having spent itself, the members may look forward with less anxiety as to employment than has been the case for the past three years, as the orders for ships of war, ordnance, and electric lighting plant all pointed in the direction of increased activity and plentiful employment for members. The total payment for sick benefit had been £4,068, against £3,324 the previous year, this being the largest amount ever paid by the society on this account, which was evidently due to the long frost during the early months of the year. Fortunately, however, death did not claim more than the average number, the sum paid for funeral allowance being £1,170, or only £72 in excess of 1894. Superannuation also showed an increase, £3,208 having been paid in 1895, as compared with £2,830 the year before, and the present worth of the superannuation fund was £11,648, having increased by interest, £350 during the year. The payment for miscellaneous or working expenses amounted to £2,036, being equal to 5s. 9d. per member, or 11½ per cent. of the total expenditure, which was not only a less average than during the preceding year, but smaller than on any former occasion.

Mr. Swift makes some very strong comments upon the methods and tactics adopted by what is usually styled the "New Unionism," and the disastrous results which have

followed in connection with most of the recently-formed organisations established simply for the object of carrying on conflicts between labour and capital. In former reports, he says, he had alluded to the theory advocated by some, that trade societies should confine their work to combatting the capitalist, and leave the provision of benefits for sickness, old age, funerals, &c., to the friendly societies. It was only some five years since this theory was first advocated, but its being put into practice had not shown lasting results. Few, if any, societies that had adopted the principle had shown any staying power, and as soon as the first excitement had passed away and it was seen that contributions had to be paid with no immediate return the membership lapsed. As evidence of this, and what might be called the rise and fall of the new unionism, as run upon these lines, Mr. Swift remarked that in 1890 there were five societies who then made returns of membership giving a total of 266,000. By the latest returns the same five societies had fallen to a membership of 54,700, and trades unionism was weaker by over 211,000 in these cases than it was only five years ago. If these societies had been financed to provide some benefits, however small, other than strike pay or management expenses alone, they would, in his opinion, still have been a power in their separate industries. Such societies as that of the steam engine makers had been derided for attaching benefits of a friendly nature, but events had proved that their forefathers were wise in their generation when they adopted the principle which they of the present generation had done their best to extend and consolidate. The result was that whilst their society was prepared for peace it was at the same time pre-



FIG. 15.

pared for war. They had capital to meet their non-combattant members' claims, whilst they also had it to defend their position if the capitalists became the aggressors, or causes arose that called for action to be taken. This course had been demonstrated in the year just closed, and the record of the separate branches where conflicts had taken place would

be scanned with interest, no doubt. At Barrow and Hull, however, the trouble was not with employers, but with cognate trades that were encroaching upon engineers' work. It was unfortunate that such conflicts should take place, as it was playing into the hands of the enemy and created a feeling of bitterness amongst workmen, when unity should be in the ascendant. These disputes cost them a fair sum, but the most important of the year were at Belfast and Glasgow. At neither place had their society an excessive number of members affected, and in consequence were not allowed a voice either at the commencement or at the close, but their members had to take up a passive attitude, and calmly wait the issue of events. They did so, and not only received the strike allowance of the society, but the hearty response of branches by voluntary contributions, testified in the first place how popular the strike was at Belfast, and in the second how the attitude of their members in the two places was commended. The course of his comments leads Mr. Swift into some very strong remarks with regard to the recent shipbuilding disputes, respecting which, he says, a good deal had been written within the last four months, much of which might have been better left unsaid. "The statement," he proceeds, "that the action of the

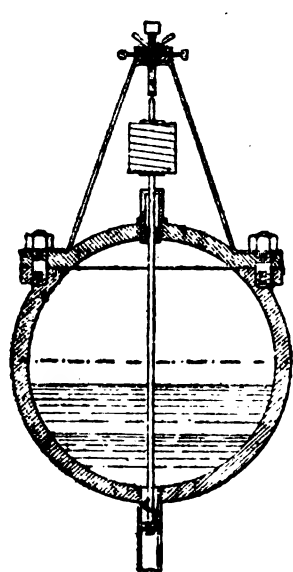


FIG. 16.

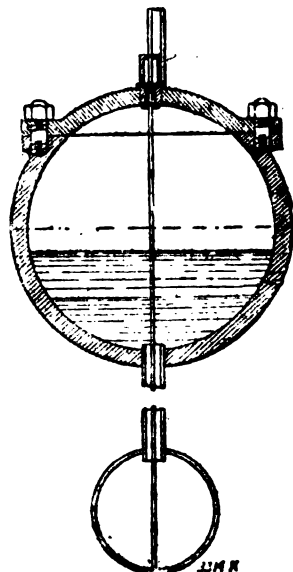


FIG. 17.

employers was for the purpose of stamping out trades unions is an old cry, but almost out of date. We do not think there is more than a very limited number of employers who have even the desire to do so, much less the thought that such a result is possible. History shows that the indomitable pluck of the British workman is proof against such attempts to break up his organisation by capitalists, but when this is attempted he is more firm in his allegiance and more earnest in strengthening his society, provided it is conducted on an equitable basis, and officered by members who are as earnest and zealous as himself. When societies are conducted upon these lines, they are an assistance to employers, as all are put upon equal terms as to customs, wages, and conditions, which places all on an equal footing in competing for work in the open market. There may be exceptions in single cases, and the exception may be made in that of the Belfast employers, who arrogantly refused any return of previous reduction in wages. To this no exception could be taken had they stood alone, but the Clyde employers, figuratively speaking, did not stay to enquire whether it was a free fight or a family quarrel, but rushed into the fray by closing their works in sympathy with the wealthy firms in Belfast. Having done so they can now as their leisure count the cost. Their private ledger showing the loss on production will certainly be a sealed book to all but themselves, but to the public it will be known that the Clyde workmen secured an advance that would most likely not at present have been asked for, seeing that only a short time before they had accepted a compromise on wages, and

this even had not been paid before they were locked out. Having locked out their own men, other centres were asked to federate, and make common cause with them in their own rash policy. Fortunately the other centres were more rational, and although it was understood they were full of sympathy, their inaction showed they were at least human, and would not turn adrift old employes to cover the rash action of the Clyde employers, who in the long run had to concede an advance beyond what the men had previously agreed to accept. After this experience it is doubtful if the Scottish Employers' Federation will resort to such an expensive experiment again. Possibly they may have had an object in view, if not to annihilate trades unionism to at least weaken its power for the time being. This, however, will only have a temporary effect, as with a revival of trade the lost ground will soon be recovered, and each society affected able to replenish its coffers and provide the capital, which is as vital a matter as numbers. Numbers may be a momentary power, but to make this effective and lasting there must be finance to support them. Finance is as vital to trades unions as ammunition and ordnance to a well-trained army, and this fact is evidenced in all great conflicts between capital and labour. Whilst possessing this power, even in times of peace, the workmen's unions are able to watch over the boundary lines and see that there is no encroachment on their provinces and belongings. The disputes named have been an object lesson in other than the affected districts, as our list of admissions fully prove. It has had the effect of recommending combination, as the action might have been taken in any other locality; hence the desire to be prepared. The newspapers giving prominence to the question, young men have been anxious to be part of an organisation, offered themselves as candidates, paid the entrance fee, not waiting for a conflict, and then looked to trades unionists to support them. This desire is still manifest, and it rests with the present members as to how far they will assist in securing a benefit to their society by means of the many who are now open to be canvassed and initiated."

### SANKEY'S PATENT CORRUGATED METALLIC LIFEBOUY.

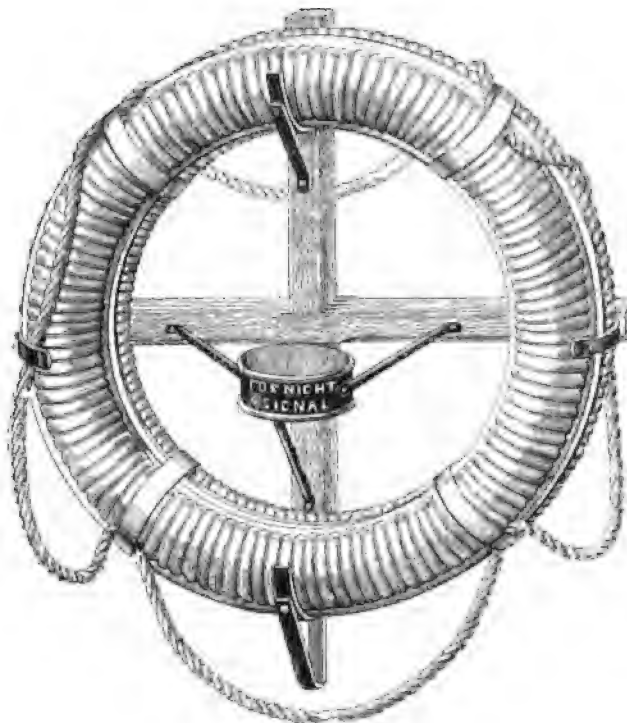
THE accompanying illustration represents an ingenious adaption of the strongest form of structure, namely, corrugated metal, to the lifebuoy.

Sankey's patent lifebuoys, fully sanctioned by the Board of Trade, are 25 per cent. lighter than a new cork buoy, but while an old cork buoy is generally so sodden with water and thickly coated with paint as to be incapable of supporting even its own weight, a Sankey buoy after 12 months' service is capable of sustaining 36 lbs. weight of iron in the water for any length of time.

These buoys are made by special machinery and stamped, each half, out of a sheet of non-corrodible metal, the joints being made by clinching the edges over each other, after which the seams are thoroughly brazed, thus ensuring that the joints are as strong as any other part of the metal. Made so as to retain the exact size and shape of the present cork lifebuoy, the metallic construction renders them proof against the action of all weathers, climates, or sea-water, and owing to their great strength they cannot be broken by any action of the waves, while a man can be safely landed right aboard without the least danger of the buoy breaking (as a cork buoy certainly would do).

As will be seen from the illustration, each buoy is provided with a neatly constructed patent holder, so arranged that in the event of the vessel foundering, the buoys will automatically detach themselves, thus giving those on board a chance for their lives, and

also, by setting the buoys afloat, providing some evidence of the loss of a vessel. When repainting, the buoys can be replaced at once in this holder without having to wait for the paint to dry, thus necessitating



very little handling, and as they are always in their place the buoy is ready at a moment's notice and can be instantly detached as there are no lashings to cut or unfasten. They carry a receptacle for the usual night signal, and meet every requirement of the Board of Trade.

The patentees and sole manufacturers, Messrs. Joseph Sankey & Sons, of Bilston, Staffs., will furnish any further particulars.

### THE FOUR-MASTED "PRESIDENT FELIX FAURE."

WHEN the President of the French Republic visited the works of the Société des Forges et Chantiers de la Méditerranée, at Havre, on April 16th, 1895, he was presented with a model of a sailing vessel ordered by a syndicate of Havre shipowners, who had just formed a company under the style of "Compagnie Havraise de Navigation à Voile, E. Corblet & Cie." in order to take part in the movement set on foot for the revival of sailing navigation.

Monsieur Felix Faure, feeling anxious to encourage the new departure, gave his consent to the new ship bearing his own name.

The following are the principal dimensions of the vessel, which was designed by the Société des Forges et Chantiers, with the aid of Mr. Wilkinson, engineer of Lloyd's, who superintends this register in France with the highest ability:—

Length, 90 metres; beam, 13.80 metres; depth, 8 metres; sail surface, 3,500 sq. metres; gross burden, 2,800 tons; tonnage with full load, 3,800 tons.

The *President Felix Faure* was launched on Monday, February 3rd, at the Gruville shipyard, in presence of a numerous gathering.

Miss Lucy Felix Faure, with M. Louis Brindeau, Deputy and Mayor of Havre, acted as sponsor to the new vessel. The guests invited by the "Compagnie Havraise de Navigation" and "La Société des Forges et Chantiers," included all the chief representatives of the administration and military authorities, commerce and shipping, in Havre. The launch was in every way a success.

The invited guests were received by M. Joliet Pastre, chairman of the Société des Forges et Chantiers, assisted by Messrs. Bricard, manager of the works, Coville, chief engineer of the shipyard, and by all heads of departments.

### THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

#### Old Steamers.

THE passing of two very notable Atlantic liners has to be noticed this month. Giving the precedence to age we take the quondam Cunarder *Palestine*, which has attained the patriarchal age of thirty-eight years. Built as long ago as 1858 at Greenock, by the famous firm of Messrs. R. Steele & Co., she was rejuvenated in 1872, when she was lengthened and given new engines. The Cunard Company employed her on their Boston route as well as in the Mediterranean trade, for which, as her name suggests, she was primarily intended. After the Cunard Line parted with her she was still employed in the Boston trade for many years. At the time when the "Atlantic Ferry" was written, Mr. Maginnis spoke of her as the oldest vessel then employed in the Atlantic trade. He, however, gave her three years more seniority than she appears to have been entitled to, for he says she was built in 1855, whereas I find in the Liverpool Red Book, Lloyd's Registers, various Parliamentary papers, and last, but not least, the advertisement of her sale, that 1858 was the true date of her launch. Here then is another correction to be made in my readers' copies of Mr. Maginnis's book. Returning to the *Palestine* I may add that she had another set of boilers in 1881, and that she is now lying at Barrow. She will be offered by Messrs. Kellock's on the 5th March.

A still more notable vessel is the White Star steamer *Oceanic*. She was launched in August, 1870, and early in the following year made the first sailing for the now famous company. The interest which her appearance created will be within the recollection of many of my readers. So, too, will be the sinister prophecies that were made as to her fate when a vessel of such proportions as hers met with a true Atlantic gale. There were even those who started rumours that these prophecies had been fulfilled. But the old ship has lasted to see her model and arrangement universally adopted in the mail steamer of the present day. To those who had crossed in the old flush decked ships with staterooms, no smoke-rooms, and few conveniences of any kind, the change this vessel inaugurated will be well appreciated. After two or three years in the Atlantic trade, the *Oceanic* was sent out to the Pacific to run on the San Francisco and Hong Kong route for the Occidental and Oriental Company. In 1880 she came home through the Canal and was re-boilered and redecorated and went back to her station. There she remained the favourite ship on the route till the beginning of 1895. Her hull was said to be as sound as ever, and she only comparatively recently made a record on her route. But her machinery needed renewal. She accordingly came home again and went to Belfast, the charterers on the Pacific preferring to have her back rather than take a more modern vessel. It was found, however, that it was not worth spending as much money as would have been necessary on a vessel of her age, and so the *Doric*, recently overhauled, has gone out to take her place, and she has been brought over in tow to the Thames to be broken up. Those who are interested in the development of steam navigation will lose a great opportunity if they do not inspect her before it be too late.

#### The National Steamship Company's Affairs

are at last arranged. They have accepted what appears a most advantageous offer from the Atlantic Transport Company whereby the old concern will not be entirely lost. In pursuance of this arrangement the places of two of the directors on the board of the old company have been taken by two members of the firm which manages the affairs of the Atlantic Company. This concern, with its fine modern ships, could, of course, have no use



for the vessels of the National Line, but it could do with the old line's connection, and it has also lessened the keenness of competition between the ports of London and New York and so benefited itself very considerably by its action.

#### Atlantic Passenger Statistics.

The returns of passengers from Europe landed at New York have been published. It appears that only 792 trips were made in 1895, as against 1879 the previous year. But more passengers were carried and so the average per trip is distinctly higher. In 1894 the number of steerage passengers had fallen to 188,164, —about half those carried in 1893. In 1895 the number rose again to 258,560. As to cabin passengers, we find that Cunard have carried between 18,000 and 19,000 each year for three years, 1895 being about 500 better than its predecessor. The American Line, which carried 14,374 passengers in 1893, fell to under 14,000 the next year, and rose to 16,146 in 1895. Though they made two more trips in 1895 than in 1894 this will not alone account for the increase. The probability is that now that the line has all its four big boats at work, the present year will see the American Line's figures further improved if the present be a good passenger season.

#### The Cape Services.

Rumour has it that the Castle Line is to be reinforced by two large mail boats from the Fairfield yard. Their tonnage is put at a slightly larger figure than that of the *Tantallon Castle*, and the length will be about 10 ft. greater than hers, the beam being similar. Nothing has been said as to whether the new boats will have single or double screws. Meanwhile a vessel of under thirteen years' standing has been sold out of the service.

It is also reported that during the *Scot's* sojourn at Belfast she will have a very complete overhaul and will be structurally altered in some respects. Although this vessel is one of the most yacht-like of all the big mail-boats and is famed as a record-breaker on her own route, almost beyond anything afloat, she cannot be considered a very lucky ship, for she has on a previous occasion met with a mishap which necessitated her temporary withdrawal from the port of Southampton.

#### A Graceful Act

has been performed by Mr. Ismay, in giving a sum of £2,000 for the foundation of an engineering scholarship in memory of his friend, the late Sir Edward Harland, with whom he has had so many and so successful business transactions in respect of the designing and building the famous vessels of the White Star Fleet. It will be difficult to devise a more appropriate and useful method of commemorating such a man.

#### A Gallant Rescue.

The loss of the *s.s. Aidar* in the Mediterranean showed in two ways the stuff of which British seamen are made. Early one Sunday morning in December, the *Staffordshire*, commodore ship of the Bibby Line, was outward bound to Rangoon and in the neighbourhood of Messina, when signals of distress were observed and a steamer sighted on her beam ends and apparently sinking fast. The sea was high, but Captain Harris, of the *Staffordshire*, soon had a boat out which on the first trip saved twelve, and on the second nine men from the wreck. At the third attempt the rescuers had their boat stove in, and had to return. Another boat was promptly got away in charge of the second officer—this took off eight more. One of these was a passenger whose heart failed him, and he refused to make the plunge to the boat till Captain Nutman, of the *Aidar*, threw him towards it. The *Aidar* was now going down so fast that it was dangerous for the lifeboat to remain in the vicinity, and Captain Nutman told them to shear off with all speed. He refused to leave his ship as he had an injured fireman in charge. The second officer of the *Staffordshire* saw that there was no time to waste in argument, if he were to save his boat's crew and those already taken off the sinking ship, for the *Aidar* was, in truth, going. As soon as possible, however, he returned to the spot where she had foundered, and there found Captain Nutman with the fireman, for whom he had risked what seemed certain death, hanging on to an overturned boat. This was an instance of very great heroism on the part of the captain of the sinking ship, and worthy to be coupled with it is the seamanship of those in charge of the *Staffordshire* and her boats—of men who managed by their coolness and skill to prevent the disaster, involving what might otherwise have been very serious loss of life.

#### The Short Sea Route.

The reference to the sea service made by the chairman of the London, Chatham and Dover Railway at the line's recent meeting, is not without interest for those who watch the Channel Fleets. The chairman congratulated the proprietors on the approaching advent of the two new paddle boats, the *Dover* and the *Calais*, which have just been completed by Messrs. Denny & Co. We can sympathise with this congratulation if it permits the release of the *Foam* and the *Breeze* and the other old craft which ought long ago to have found their way to the scrap heap. The chairman also indulged in a little cheap self-satisfaction at the class of name given to the vessels of the service, and a poor little scoff against the classical names which some people prefer. There may be much said on either side. *Dover* or *Calais* are not names that we should be inclined to find fault with in any event. But in the same class come *Coalville* and *Stoke Pogis*, and no one could urge that the beautiful classical names—many of which have association with the gallant deeds of our navy in former years—do not compare very favourably with such as these.

The reference to the extravagance of some of the competitors in the continental traffic was interesting. Mr. Forbes remarked that the Belgian steamers ran at a cost of some 30s. a mile, and did not earn one-twentieth of that sum. He remarked that the Chatham Company, not having a national purse at its back, could not afford to trade on those lines. There is some weight in what he says. But there is also something to be urged on the other side. The Belgian Government is not running its steamers on charitable grounds. It is making an investment, though, whether it be one that will turn out profitable or not, the future alone can decide. We all know that facilities breed traffic and that of recent years the Ostend traffic has gone on advancing by leaps and bounds. We know, too, that it is a canon with most managers of railway steamers that they can afford to lose over the boats because of the stimulus they give to the railway receipts proper. We have no means of judging to what extent the Belgian State railways have benefited from the improvement of the boat services, but it is certain that the increased traffic must have been very considerable. We also feel sure that the wretched condition of the smaller boats used by the Chatham line has done much to stop the development of their through traffic in passengers between this country and the continent. If the Chatham Company had desired economy, it might well have made a new departure with its latest craft and left the antiquated and expensive paddle for the State-aided steamers. Then, perhaps, there might have been some point in the chairman's gibe

#### The Twin Screw

makes progress, and even the most conservative lines are beginning to see its value. The great British line to the eastern and southern seas has been one of the longest to delay its adoption, but at last even the P. & O. Company has seen that its advantages more than counterbalance its extra cost. Perhaps their recent experiences, noted in this column, with the *Australia* and others of their fleet, have quickened their resolve. At all events they have made the plunge and placed an order for a big steamer, with twin-screws, with the Palmer Company. This is a feather in their cap for the Newcastle firm, who evidently gave satisfaction with the trial order given them when they built the *Borneo*. There now remain few important companies who adhere to the old-fashioned single screw, and the number of salvage actions on account of towage, where shafts have been broken, will, in future years, show a very substantial decrease. A sister vessel was, about the same time, placed with Messrs. Caird & Co., of Greenock.

#### A Mistake.

Earlier in these Notes I told how the old White Star *Oceanic* had been towed round to the Thames to there meet with dissolution. Whilst she made her last trip another vessel of the same name, but hailing from the port of Sunderland, was bound across the Western Ocean and broke her shaft. She was picked up and was sighted, in tow for New York, by the White Star Liner *Germanic*, which, on arrival at Sandy Hook, made her report of what she had seen. Dalziel telegraphed over that the vessel sighted in tow was "the White Star steamer *Oceanic*," and the *Times* published the information. This is unfortunate. But the American news agencies and some of the London papers are always quick to publish anything against the White Star Line, flying the British flag, without making any allowance for the truth of the allegations. My readers will remember that the *Oceanic*, of Sunderland, is

## Disasters.

The *S. Paul* is, I am glad to say, showing signs of having taken a turn in her luck. She came off her bank of sand at ten o'clock on the morning of the 4th inst., and she did not—as far as one can see—move a moment too soon. Suffice it to say in support of this remark that the steamship *Lamington*, of Glasgow, went on to the beach very shortly after she left it, and, the weather becoming immediately very bad, she seems in a fair way to leave her bones there. At all events the weather was bad enough to make those on board take to the rigging, whence, not without difficulty, they were rescued by the breeches buoy. The *S. Paul* proceeded to her dock under her own steam, and is said to be practically uninjured. When she first came off she was advertised to leave New York on the 19th February, and to start westwards again on the 29th. That sailing, however, is now being taken by the *S. Louis*, whose long promised refit—whereby she is to get her larger funnels—is suffering several postponements. From the fact that the *S. Paul* could not sail on the 19th, we may surmise that she was somewhat more injured than was at first supposed. But the fact that she could steam to New York when she came off is a sufficient testimony to the excellence of Messrs. Cramp's work.

In this regard it is well to mention that the report that the *Campania* was close behind the *S. Paul* when she stranded, and that she would have gone on after her but for the American liner's warning blasts, meets with an absolute and official denial from the Cunard Company. From the official accounts of the disaster to the *S. Paul* it appears that she took the ground at 1.47 a.m., being then eight or nine miles south of the position in which her officers reckoned her to be. The *Campania*, according to those in charge, was never near the New Jersey beach at all. She anchored at 1 a.m., and remained at her moorings till long after daylight.

Those interested in shipping at the other side, with the true practical spirit of Americans, are, as soon as the *S. Paul* is salvaged, beginning to reckon what the salvage award will be. There are several precedents on the point. Perhaps one of the most recent vessels to need such services as she obtained was the old *Persian Monarch*. Then there was previously a French mail steamer. Neither of these vessels, of course, was half the size of the *S. Paul*, so that the difficulty of weight was much less in their case. And each of them was a comparatively old ship, so that the question of value involved was much less serious. Yet, in one case, the ship was sold by the salvors to satisfy their claim, and in the other the award amounted to something over twenty thousand pounds. We may, therefore, expect to see a very big claim made in the present case.

There is a prospect of another salvage claim in respect of an Atlantic liner in the wind. This latter one is to be settled on this side of the Atlantic. The Cunarder *Catalonia*, outward bound to Boston, broke her shaft on the 21st January. On the following day she was picked up by the North German Lloyd liner *Braunschweig*, and towed by her into the Azores, where both ships arrived on the 28th. Two days later the *Braunschweig* proceeded on her voyage to the westward, taking on with her the passengers of the disabled liner. As for the *Catalonia*, a couple of Liverpool screw tugs were despatched for her, and she was towed home to Liverpool for repairs, arriving there on the 16th February, after a nine days' voyage. It is not so very long that we have had the advantage of a cable to the Azores, and it is an occasion like the present that proves its value, for there would have been very great anxiety as to both liners, as their time for arrival at the American end of their trip came and passed and nothing was heard of them. It is quite possible that no news would have been heard till the *Braunschweig* reached New York, and then arrangements would have to be made by mail as to the *Catalonia's* fate. As it is, she was almost home again before, under the old experience, her owners could have known of her mishap. The saving of anxiety and of money by the telegraph system is a thing we are so used to that we very seldom realize how much we owe to it, and how dependent we are upon it.

The collision between the *Germanic* and the *Cumbræ*, at the mouth of the Mersey, has resulted in a long trial. Both sides alleged that the collision was due to the fact that the other vessel was on the wrong side of the Crosby Channel. They, of course, varied in the place where they said the collision occurred—for each said it occurred to their own right of the mid-channel line. In the event, the court found that the *Germanic* was on her right side,

and that the *Cumbræ*, consequently, was not on hers. It was considered, however, that each vessel was going somewhat too fast considering the state of the weather. The fact that the White Star boat was under the charge of a pilot by compulsion of law, and that the regulation of a steamer's speed is within the discretion of the pilot, made this fault not tell against her, and an opportunity was given to the court to see how perfect are the arrangements for the navigation of the best class of mail steamer. After a very searching inquiry the court expressed its satisfaction with the arrangements of the liner and the way in which officers and men carried them out. This is indeed a feather in the cap of the company.

## The Anchor Line.

As a change from the Channel Lines I have tried this month to afford what light I could upon the history of the great Scotch Company—by which, of course, I mean the Anchor Line. What information the firm of Henderson Brothers had ready has been placed at my disposal, and, though it is not as full as I and my readers would like, it is marked by two characteristics which show the mettle of which such firms are made. The reader knows well the ordinary stuff which is put into companies' albums. If all printed there were believed, it would be taken as gospel not only that the concern never lost a ship, but that they were never even delayed by fog or got their docks wet by anything worse than the matutinal hose. The Anchor people are not of this class, they speak of the disasters which any line of their immense ramifications and considerable age are bound to have had, and the fact that they allude to them shows that they are not afraid to acknowledge the risks which even now are inseparable from shipping property. Another point in which their information is somewhat strange to him who has had a course of album reading is in the fact that they admit that their crack boat, the *City of Rome*, is the "show boat of the fleet," and they proceed to describe one of the smaller boats as being typical of the general ruck. One is so used to reading that "the ——— (naming, of course, the last and fastest and biggest of the fleet) may be taken as an example of the ——— fleet," that this treatment is almost bewildering.

But to deal with the history of the line. Its beginnings were unpretentious. A converted sailer was the pioneer boat across the Atlantic. She, however, only made two voyages for reasons beyond the manager's control, and the Atlantic service was dropped for some years. The Mediterranean and the Pacific claimed their attention, and, indeed, to this day the Mediterranean is a very important part of their field of operations, especially if we include in it the off-shoots which it has made, through the Suez Canal to India, and through the Straits of Gibraltar across to America with Italian emigrants, who are anxious to escape the horrors of conscription and the high taxes which the glory of forming a part of the triple alliance forces upon that country. And in "America," I include both the Northern and Southern Continents.

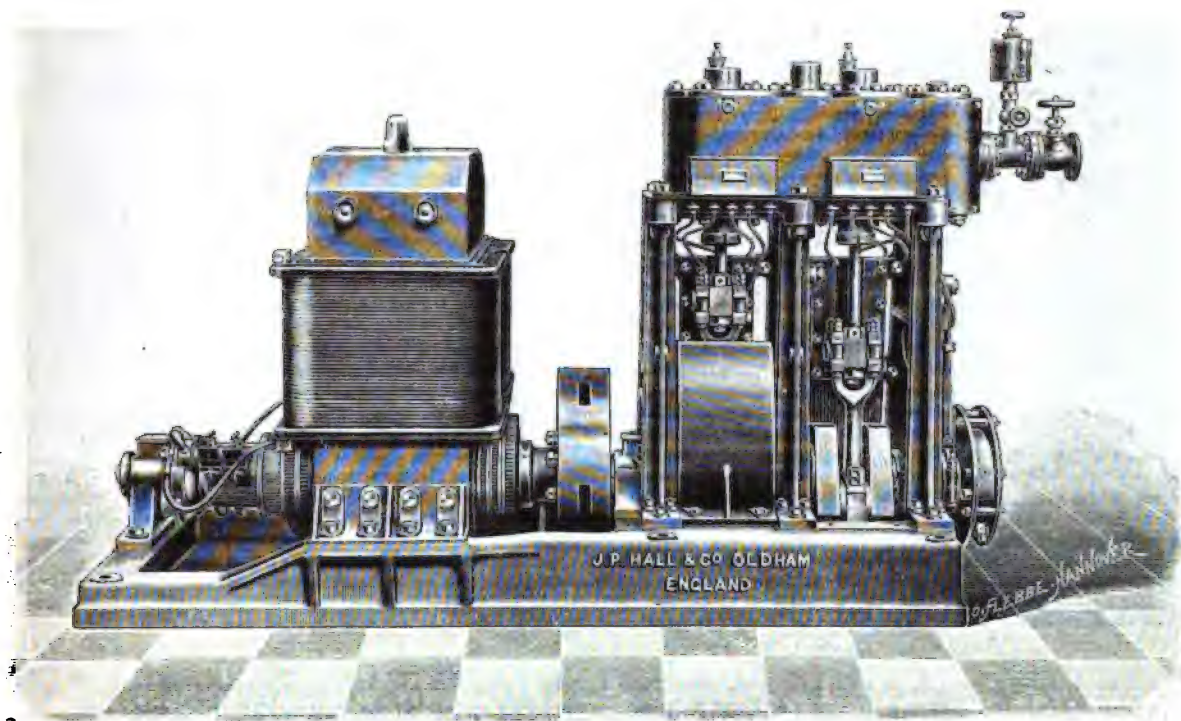
The Atlantic trade had been attempted in the first place at a very opportune time, when the old Glasgow Line had just been absorbed by Inman's, but for the reason I have stated, it was intermitted till 1859, when a fortnightly service was re-commenced with two vessels of very respectable dimensions for those days, viz., the *Britannia* and the *Caledonia*. Another Atlantic service was attempted from Bordeaux in 1875, the year when the Indian extension of the Mediterranean was made. But whilst the Eastern development has prospered to this day, there was no encouragement to proceed with the French Line. A few years later, as I find from independent sources, there was a branch from Barrow to New York. With Barrow the line had been largely connected. The old Meadowside yard and the Barrow Shipbuilding Company have between them turned out a very large proportion of the more recent vessels of the fleet. Another development was the express line between Liverpool and New York, in which the *City of Rome* was engaged in fortnightly sailings for many passenger seasons after she came under the Anchor flag. One season she had as consort the *Austral*. Another the *America*, and yet another she was aided by the big Anchor liners *Belgravia* and *Furnessia*. Now, however, the main Atlantic service, at least from British ports, is confined to the original Glasgow-New York line, which is maintained weekly, calling at Moville. In it are run such vessels as we have named, the *Furnessia* and such like all the year round, the *City of Rome* only during the passenger season.

**A very Silly Article**

has been printed by a paper, which, owned by an American, appears in London, and ought to be quite well versed in all that concerns the means of communication between the countries of its adoption and of its origin. In what would make a couple of pages of the *MARINE ENGINEER*, the writer discusses the science and history of record-breaking, and then proceeds to take his experience out and home by two different lines, and to complain that he did not break the record. I am afraid the writer of this article did not expect anyone to take him seriously. But the *MARINE ENGINEER* must take him seriously or not at all. He seems to believe in the theory, "once a record breaker always a record breaker." If he will apply his mind to the fallacy in the statement, "once young, always young," he will see the want of reason in his own idea. The vessels which are youngest are most likely to hold the record. As the advance of science takes place, vessels which once were the fastest and held the record, even if they keep their best speed, get left behind in the race by more powerful and younger rivals. Besides this, let me tell the writer that the month of December is not the time to

J. & G. Thomson, Limited, of Clydebank, for s.s. *Kiev*, the latest addition to the Russian Volunteer Fleet (an account of the launch of which appears in another part of the present issue). We may also mention that this vessel has been fitted throughout with a complete system of electrically driven fans for ventilating purposes, all the motors for which have also been made by Messrs. J. P. Hall & Co. The following description of the engines and dynamos will be of interest.

The cylinders are 5 in. and 8½ in. diameter by 7 in. stroke, with the low-pressure valve between, and the engines are constructed to give 25 I.H.P. at 300 revolutions per minute, with 120 lbs. steam pressure when exhausting into the atmosphere. The moving parts are all as light as is consistent with strength, and the pistons, which are dome-shaped, are of steel, the cross-



break records to the westward. This is done when summer suns shine and the melting of the icebergs allows the short course to be adopted. This writer finds fault with a Liverpool liner because she did not go full speed in a fog which he admits was "so thick that you could not see your most intimate friend two yards off." But this admission is enough to show that such a writer is unworthy of serious criticism.

### IMPROVEMENTS IN ELECTRIC LIGHTING PLANT FOR STEAMSHIPS.

A SHORT time back our representative visited the Blackriding Ironworks, at Werneth, of Messrs. J. P. Hall & Co., where he was shown some improved designs in combined compound engines and dynamos, specially constructed for ship-lighting purposes. We give an illustration of one of these, three sets of which have just been completed to the order of Messrs.

heads being of cast-steel lined with magnolia metal. The connecting rods are of best forged steel of the ordinary marine type, with phosphor bronze bearings. The crank shafts are also of forged steel and each line of moving parts is separately balanced with weights forged on the crank shafts, the cranks being placed on opposite centres, so that the engines are balanced as a whole, and run with no variation without being in any way fastened down. The beds are made, as will be seen, with an extension for carrying the dynamos, the main bearings being cast on and truly bored in position and bushed with phosphor bronze bushes, the one at the flywheel end being double length to carry the weight of the armature and flywheel. The governors are of the firm's patent automatic type, which are so arranged that they vary the stroke of the eccentric from 2 in. to 1 in., and which from their design have very little friction and are very quick to take up any small variation in load, and the en-

govern to within two per cent. with no load or full load. The dynamos are slow speed, with drum bar armatures, and give 120 ampères at 100 volts with a maximum temperature rise of 60 deg. Fahr. after six hours' run with full load, and the magnet coils are wound on strong sheet iron bobbins, with teak flanges carrying the terminals. The lubrication throughout is continuous, and ample provision is made for catching the waste oil, whilst the cylinders are provided with spring relief valves, as well as the ordinary drains. The whole arrangement is exceedingly compact, and takes up comparatively only a very moderate space, so that it is specially applicable for lighting purposes on board ship, where the above point is a matter of importance; and the firm are supplying a large number of these engines and dynamos to the leading ship-building establishments and electrical contractors.

small combined tandem compound engine and dynamo used for testing at this end, which runs up to 600 revolutions, and gives 150 volts and 25 ampères. The main building has a wood block floor, upon which this engine stands, but is in no way fastened down.

### DELTA BRONZE PROPELLERS.

THE accompanying illustration is a reproduction of a photo of the propellers of the Russian Imperial yacht *Standard*. The yacht is really a powerful cruiser but at the same time fitted up in a most luxurious style. The I.H.P. is 12,000.

The propellers (bosses and blades) are cast of Delta bronze, and the studs forged of the same metal. The



The firm also make other types of engines, dynamos and motors, both for direct and independent driving. It may be added that Messrs. Hall's Blackriding Iron-works were completed about two years ago and have been specially designed and equipped for the construction of dynamos, motors and engines. The main shop is 130 ft. long with 25 ft. clear span, and 24 ft. to the underside of the principals, and is served with an eight ton electrically driven travelling crane, running the whole length of the shop, and within reach of this are the heavier tools. Along one side and open to this, is a two-storied building, the lower floor of which contains the smaller tools, the upper one being the brass-finishing departments. The premises are lighted by electricity, the dynamo being driven from the shop engine, which, along with another larger engine, is placed under the gallery of the main shop, the driving being by cotton ropes; and a quick-speed engine 14 in. by 14 in. is used for testing the dynamos. The testing bed is also conveniently arranged with steam and exhaust pipes for connecting to engines and direct coupled sets. There is also a

total weight is  $27\frac{1}{2}$  tons. The screws are three-bladed, and one spare blade was supplied for each.

Test bars were cast on to each of the two bosses and eight blades, the mean tensile strength being  $36\frac{1}{2}$  tons per square inch with an elongation of about 15 per cent.

### THE COMPOSITION OF SEA WATER.

By RALPH RIGBY.

ONE of the most interesting branches of an analytical chemist's profession is the analysis of water, and as this interest is shared by engineers, a few results with notes thereon may not be without interest to our readers, especially as the purity of the water used in marine boilers is of the first importance, and more especially in those using a high steam pressure. The salts in solution in sea water amount in all to a little over  $3\frac{1}{2}$  grains in 100 grains of water, or, in other words,  $3\frac{1}{2}$  per cent. of sea water by weight consists of dissolved salts. Sodium chloride or common salt is the chief, averaging 2.7 of the whole  $3\frac{1}{2}$  per cent. of saline ingredients. The following is an exact analysis of sea water:—

Water .. .. .	96.470
Sodium chloride .. .	2.700



Magnesium chloride .. ..	360
Potassium chloride .. ..	070
Magnesium sulphate .. ..	230
Calcium sulphate .. ..	140
Calcium carbonate .. ..	008
Magnesium bromide .. ..	002
Estimated iodides, silica, &c. ..	025
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	100-000

Though the average proportion of salts is, as already stated, about  $3\frac{1}{2}$  parts in every 100 parts of water, yet there are slight variations.

Next to sodium chloride, the principal solids in solution are, as will be seen on reference to the above analysis, magnesium chloride, magnesium sulphate, and calcium sulphate. Sodium chloride possesses the singular property of being equally soluble in hot or cold water, 100 parts of which will dissolve about 36 parts to fully saturate the liquid. Magnesium chloride is highly soluble, and is retained with much obstinancy by water, even to the extent of decomposition if much evaporated. Magnesium sulphate is also freely soluble in water, and its solubility increases with the temperature. Calcium sulphate, however, is, according to Regnault, at the point of its greatest solubility at a temperature of 95 degrees Fahr., when it dissolves only in the proportion of 2.54 to 1,000 parts of water, at 212 degrees only 2.17 are soluble, and at 290 degrees the point of complete solubility is reached. Calcium sulphate, it will be observed, becomes, at a temperature agreeing with about 40 lbs. per square inch of steam pressure, entirely insoluble. In conclusion, an analysis of boiler incrustation from sea water may not be out of place.

#### BOILER INCrustATION—SEA WATER.

Calcium carbonate .. ..	42.55
„ sulphate .. ..	35.99
Oxide of iron .. ..	8.62
Magnesium carbonate .. ..	4.28
„ chloride .. ..	0.24
Soda, salts, &c. .. ..	0.64
Organic matter .. ..	8.19
Moisture .. ..	1.68
Insoluble matter .. ..	7.81
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### THE AMERICAN LINERS "ST. LOUIS" AND "ST. PAUL."

THE plate illustrations we give herewith of the engines of the American steamers *St. Louis* and *St. Paul*, which we believe is claimed to be the last triumph from the yards of Messrs. Cramp, are taken from the forward and thrust block ends of the same. It will be seen that the engines are divided into two duplicate sets, port and starboard, driving twin propellers, so that if one propeller or set of engines were disabled, the vessel could still proceed at reduced speed with one set of engines and propeller. It will be also noticed from our illustrations that the two pair of tandem cylinders in each set of engines are both at the forward end, on the first and second cranks, there being only single cylinders on the lower tier operating the third and fourth cranks. Thus in the forward view the engines appear of much greater height than in the rear view, the front tandem cylinders being in this last view much dwarfed by perspective and almost out of sight. This results from the peculiar arrangement of cylinders in each engine to effect quadruple expansion. On the first and second cranks are arranged a divided pair of extreme low-pressure cylinders, each of 77 in. diameter, with divided high-

pressure cylinders above them in tandem of 28 $\frac{1}{2}$  in. diameter. The other single cylinders on the third and fourth cranks are a first intermediate of 55 in. diameter, and a second intermediate of 77 in. diameter, all cylinders being of 5 ft. stroke. The condenser and pumps are separate constructions in the wings of the ship, and not shown in our illustration, which thus leaves all the cylinders as separate castings each on their A frames bolted to a heavy box bedplate, and thus making a clear avenue between frames occupied by a forest of connecting and valve rods. Copper steam pipes are eschewed in these engines, lap-welded steel pipes being generally used with rivetted flanges. The valves, as will be seen from the form of the valve boxes, are in the form of balanced pistons as designed by Mr. Thom, consulting engineer to the American Line, who is responsible also for the general design of the engines. Cramps metallic packing is used throughout, consisting of cast-iron rings compressed by a spiral spring. Only the two extreme low-pressure cylinders are jacketed, all, however, being carefully lagged with asbestos and hair-felt. The starting and reversing is, of course, effected by a donkey engine operated by a steam cylinder 24 in. in diameter by 30 in. stroke. The crank shaft is a splendid piece of forging 21 in. in diameter, the crank pins being 22 in. with a 6 in. hole through the cranks and pins. The thrust shaft is of the same diameter as the crank shaft the propeller or line shaft diminishing to 19 in. in diameter and solid. The old-fashioned lignum vitæ bearings for the stern shaft are followed with spaces between the bearing strips for the water to circulate. The condensers are 7 ft. 2 in. in diameter, provided with the usual brass tubes of  $\frac{3}{4}$  in. diameter, and represent an area of about 26,000 square feet for an I.H.P. of about 16,000. The air pumps, four in number, are of the Worthington type, and the whole are arranged distinct from the engines in the wings of the ship, as before stated. The circulating pumps for the condenser are also of the Worthington make, and the hot condensing water, instead of being run to waste overboard, is forced up to a tank on the hurricane deck for use for bath and pantry purposes. The feed water is heated by a Worthington feed heater to 210 deg., and this firm also supplies the feed pumps, which are of the vertical donkey pattern.

There are six double-ended and four single-ended boilers, each 15 ft. 7 $\frac{1}{2}$  in. in diameter, the double-ended boilers being 20 ft. long, and the single ones a little over 10 ft. long, the shell plates being 1 9-16ths in. thick. Fox's corrugated flues, 3 ft. 3 in. in diameter, are used with these boilers which work at 200 lbs. per square inch, and the boilers contain altogether 6,656 tubes of 2 $\frac{3}{4}$  in. in diameter. The tubes, by the way, are fitted with retarders, which cause the gases to revolve spirally within the tubes, and thus increase the certainty of their impingement upon or rather contact with the interior surface, and tend to prolong their time of contact with the tubes. The total grate area is 1,144 square feet, and the total heating surface above 40,300 square feet.

The boilers are equally divided between two watertight compartments, and are worked under Howden's system of forced draught, which is a feather in Mr. Howden's cap. The stokehold is open and the air is forced into the furnaces by eight fans, drawn down a



down-take from the upper part of the stokehold and becomes heated in special chambers before it is forced into the space inside the furnace door, and thence to the fire. The vessel only carries eight days' consumption of 2,500 tons of coal, so that there is not much margin for contingencies in the shape of long detention.

The main engines and boilers by no means include the very numerous auxiliary machinery fitted in the *St. Louis* and *St. Paul*, which is all of the best and most modern description. There is, of course, a most perfect electric light installation supplied by the Electric Dynamic Co., of Philadelphia. This comprises four dynamos, each coupled direct to high-pressure engines, each of twin-cylinders of 12 in. diameter, by 10 in. stroke. The circuit, wired on the double-wire system, is divided into four independent sections. There is also a very perfect ventilating plant, the Sturveyant fans being driven by individual electric motors, as are also the refrigerating plant for the ship's stores, and even the bellows or pumps for the organ.

Tall-tales, electrically operated, are fitted up in the chief engineer's room, and at the navigating bridge to indicate the speed of the engine and the movements of the rudder, which is provided with alternate hand and steam steering gear. The usual capstans and windlasses are provided fore and aft, each with their owl donkey engines, and electric store and food elevators are not forgotten.

## NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondent.)

### The New Naval Programme.

EARLY in March Mr. Goschen is to make a pronouncement on the subject of the Navy, and the country will be informed as to the preparations which the present Government consider necessary for maintaining the security of the Empire. As we go to press before this announcement is made we can here do no more than indicate the probable line which will be taken, and can state our own opinion as to the minimum necessary. Criticism must perforce be difficult until our next issue, for although several forecasts of the programme have appeared, in the first place they differ from one another, which is not a good sign of accuracy, and in the second, none of them can be said to cover the field which it is certain the First Lord of the Admiralty will pay due attention to. There are three elements which go to make up naval strength—men, ships, and works. The human element comes first, and here it is unquestionable that Mr. Goschen's most difficult task lies. We must have more officers and more men both for active service and as a reserve. We are already in the position of having used up a portion of our reserve of officers in times of peace, and we cannot supply the deficiency in either category without considerable time and expense. We may be certain, then, that some proposal will be made in this connection, and probably it will be found that a means is suggested whereby we can the sooner obtain the services of young officers at sea by lessening the time spent in the educational establishments. Steps have already been taken in this direction, both as regards officers and men, and most probably there will be a further development on the same lines. As marines can be made efficient sooner than bluejackets, there can be no doubt that the gallant corps of sea soldiers will receive an accession of strength, and as there is no difficulty in obtaining recruits of the very best kind, this will be satisfactory to all who have any knowledge of the matter. As to the number of our

this is a subject upon which there is endless controversy.

But battleships we must have and have quickly. At present our superiority exists on a very slight margin, so slight, indeed, that some commentators make it disappear altogether. At least twelve battleships should be laid down and completed within three years, although it is not at all certain that the Government, with better information, will see the matter from the same point of view; but if this number is not laid down they must be asked for explanation on the subject. Five-and-twenty cruisers, it is estimated, we are short of the number absolutely necessary for the protection of commerce. But they need not be either very big or very powerful. Fast, well-armed, handy craft are wanted, and could be provided inside two years without difficulty. In small craft does not lie the strength of a navy, and no one now asks for torpedo boats, but the destroyer class is a good one and should be augmented. The third element is works—docks and protection for harbours. This provision will be made the subject of a Bill which Mr. Goschen will lay on the table of the House in a day or so. It should be carefully scrutinised, for more money has been wasted in this way than in any other. But the yards must be improved and the ports must be protected, so that it is a question of amount to be settled by the experts.

### Docks for New Ships.

One of the most important requirements of modern times is facility for docking the ships, which are now so much more liable than the old wooden vessels to undergo damage, and the dimensions of which have grown so inordinately. There are signs that the Naval authorities fully recognise the necessity of preparing for emergencies in this direction, and are determined to take time by the forelock in making provision in this respect for the vessels now built and building. The enlargement of Keyham yard will include some large docks, and not before they are wanted, as at present not one of the four docks at Devonport or the three at Keyham, is capable of taking a ship of the *Majestic* class. It is therefore a matter of satisfaction to know that this shortcoming is to be remedied. At Chatham there are several docks and also locks, which are large enough to take in the heaviest battleship, but in regard to at least some of the latter, it is doubtful if the foundations would stand the great weight. This question ought to be settled once and for all, and the capacity of Chatham thoroughly established. The two docks building at Portsmouth will fulfil, with those already existing, all likely requirements for some time to come. These docks are of similar dimensions, viz.: 563 ft. 6 in. in length at the coping, and 550 ft. 6 in. on the floors; the extreme width is—at coping 120 ft., and upon the floor 75 ft. The depth of water over the entrance sills is 38 ft. 10 in. at high water spring tides. The new docks are, therefore, not only sufficiently large to take the ships of the *Royal Sovereign* and *Majestic* classes, but will receive the still larger cruisers *Powerful* and *Terrible*. As there are already four docks capable of taking the above-named battleships at Portsmouth, or eight with the locks, it cannot be said of this yard that it is insufficiently supplied in this respect. Great efforts are being made to have the two new docks ready by the time the first-class cruisers arrive from Barrow and Clydebank.

### Portsmouth Dockyard.

Although there is not the same feverish activity displayed in this yard which was characteristic of the previous month, there is still a good deal going on. Steady progress is being made with the *Cesar* battleship, and she is already up to the top deck forward and well above the main aft. The *Gladiator* cruiser has also been taken in hand seriously, with the result that her protective deck should be laid before long, and the engines may well be in place before the end of the year. Overtime is still being worked on the *Eclipse* cruiser, a vessel which made a record in launching, but has for some time been left to herself. Now she is being pressed ahead and shows signs of the increased activity. The *Prince George* battleship advances in steady fashion, and is pretty certain to be completed by the date fixed. Thus all the ships building are now fairly under way, and the yard is looking forward for what may come to it under the new programme. The *Sultan*, amongst ships that have been under repair and renovation, is almost out of hand and is the only vessel in the C division of the Dockyard Reserve which is likely to make a move up in class form. Rear Admiral Fane has hauled down his flag as Superintendent of the yard and has been succeeded by Rear-Admiral Rice, who may be expected to take particular interest in the *Sultan*. Several vessels are preparing here to pay off, and one or two to be

commissioned. The *Canada*, from the West Indies; the *Mercury*, from China; the *Nymph*, from the Pacific; and the *Beagle*, from the South-East Coast of America, will haul down their pennants here. The *Grafton*, which has brought home crews from China, is also making ready to take out a new crew to the *Collingwood*, and the *Imperieuse* will hoist the flag of the new Commander-in-Chief on the Pacific station to relieve the flagship there. Of small craft we have had many visitors, the mishaps to the *Havock*, *Surly* and *Daring*, not to mention slighter accidents, having given work to the engineers and shipwrights. In this direction the work on the docks and the new entrance to the fitting basin is making good progress and the harbour dredging work and boom defence is also showing signs of the money which has been spent on it. Altogether, although the storm of January has spent itself, Portsmouth yard is in full work.

#### Reforms for Naval Engineers.

In an article on the Naval Engineer Branch which has appeared in the *Army & Navy Gazette*, and occasioned considerable comment, it is pointed out with much lucidity and acumen that now is a fitting time to finally settle the position which such a large and important section should occupy in the organization of the Navy. Several reforms are indicated as likely to be accepted as a permanent settlement of outstanding grievances, and to give satisfaction to all concerned. With regard to pay, the following are the rates mentioned as likely to meet with general approval. For assistant engineers, age from 21 to 26 or 27 years, 7s. 6d. to 9s. per day; for engineers, age from 27 to 37 years, 10s. to 15s. per day; for chief, staff, and fleet engineers, reckoning junior time as at present, age from 35 to 55, 16s. to 30s. per day; for inspectors and chief inspectors of machinery, age from 50 to 60, £2 to £2 10s. per day. As regards the assistant engineers, they are all now qualified and responsible watch-keeping officers, and therefore the first year's service, which is now probationary, should count as confirmed time covered by commission. The allowance of 1s. per day for senior engineers of ships of over 3,000 I.H.P., should be increased and form a definite proportion of the charge pay of the chief engineer of the ship—say one-third. As far as rank is concerned the engineers ask that their rank should be substantial and definite, and that the system of classifying them in certain grades as "with but after" should be abolished. The grade of warrant officer might also be opened to the petty officers and men of the engineer branch, as an additional inducement to zeal and good behaviour. The stokers, too, who re-engage for a second term of service, might be given the 2d. a day extra which is granted to bluejackets of the seamen class. In addition to the above reforms, the writer of the article referred to pleads that the whole of the mechanical branches of the Naval service should be consolidated into one body and called the Royal Naval Engineer Corps, and that engineer officers should be granted executive rank and titles, with power to award minor advancements and punishments to their own men. In this way the corps would be placed upon a similar footing with regard to the Naval service as the Royal Engineers bear to the Army.

#### Machinery of the "Barfleur."

It is now a recognised fact in the British Navy that although the results of trials may be, and perhaps are the best indication of the speed of a ship when it is desired to make comparisons with other ships, it is not only frequently but usually the case that after a ship has been in commission for some little time, and those on board have got accustomed to her ways, even better results from the point of view of what the ship can do on active sea service are obtained. The *Barfleur* battleship is a case in point. The machinery of this vessel is in the hands of Fleet-engineer Thomas New, and he and his assistants deserve every credit for the record passage which the vessel is reported to have made in the Mediterranean. She was set to run from Salonica to Malta, a distance of 740 miles, and covered this distance in 45 hours, which time includes the working up to full speed as well as the easing down to enter the harbour. The average speed, therefore, is 15.5 knots, which can only be regarded as a splendid performance, and one that both her officers and the Greenock Foundry Co., who made her engines, have every reason to be proud of. This ship and her sister, the *Centurion*, now the flagship on the China Station, have both shown themselves to be fast steamers, and indeed may lay claim to be the fastest battleships afloat, for the *Royal Sovereign* class are not credited with much

more than 15.5 knots under similar conditions, and the *Majestic* class are not likely, when their time comes, to exceed this record very greatly. It must also be taken into consideration that the *Barfleur* and *Centurion* are sheathed ships, and that when she made this run she had not been in dock for over a twelvemonth. In the report received by the Admiralty it is stated that no difficulty was experienced in keeping steam, and that everything worked most smoothly and easily. It is another circumstance to the credit of the stokers of the *Barfleur* that the vessel was somewhat short of her full complement of coal, this fact necessitating extra work in trimming bunkers and in the supply of coal.

#### Chatham Dockyard.

The next vessel to make her steam trials from this yard will be the *Victorious* battleship, the engine contractors for which vessel, Messrs. Hawthorn, Lealie & Co., are doing their utmost to have her ready by March 31st, so that the ship may be completed for sea in the following July. Overtime is being worked on the *Minerva* cruiser, as she is also to be ready in the summer, and the *Vindictive* cruiser, is already showing the appearance of a ship, and giving evidence of the extra work that is being put into her since she was laid down. The engines of this ship are being made in the yard, but the boilers of the *Belleville* type will be supplied by contractors. The delivery of vessels proceeds apace, and several destroyers are being made ready for immediate commissioning. Among those in hand or commissioned during the month are the *Porcupine*, *Opossum*, *Sunfish*, and *Haughty*. The two first named have made machinery trials, and the *Sunfish* has taken the place of the *Havock*, broken down. Of larger vessels to be delivered soon, the *Diana* and *Venus* cruisers are expected, and will be taken in hand at once, and the *Hannibal* battleship, it is now reported, will come here, but this is uncertain. Of destroyers to be delivered, the *Hardy* comes from Sunderland, the *Ranger*, *Swordfish*, and *Spitfire* from the Tyne, and the *Zebra* from the Thames. The work on the new ships building, the *Illustrious* battleship and *Vindictive* cruiser is also very satisfactory, while of vessels refitting the *Monarch* is being fitted with a new propeller, and the *Severn* is having a thorough overhaul which is to be completed by the end of the financial year. Thus, although the yard does not show quite an equal amount of activity to that which was exhibited in the previous months, there is still no sign of abatement in work, and at least a battleship and a couple of cruisers are expected in the new programme for our share. In another branch it may be said that the operations in connection with the new Naval Barracks have at last been taken in hand, and the execution of this part of the scheme of improving Chatham is to be pushed ahead. The old prison is to be utilised, and an entirely new range of buildings added, so that, when finished, it will be a very fine establishment. It will take the place of the four hulks which are now used for berthing the men here, and when they have disappeared there will be more space in the fitting-out basin, and not before it is wanted.

#### The Navy League.

This institution, our readers will remember, owes its being largely to a series of articles which were written for the *Pall Mall Gazette* by Mr. Spenser-Wilkinson, a gentleman who has made German military methods his study, and who appears to wish to model our naval administration on similar lines. The League, however, was in its early days in a very rickety condition, largely because those best qualified to act as critics of our Government in its naval aspect failed to appreciate the changes which Mr. Spenser-Wilkinson and his friends desired to bring about. Eventually the more clear-headed or more sound-minded of its members resolved to throw on one side what the scoffers termed "fads," and to enlist the sympathies thereby of a larger circle of supporters. As soon as it was understood that the League had definitely declared its purpose as educational only, the *Times* and the *Service* journals accorded it a hearty support and a number of influential gentlemen joined the association. About the same time Mr. Spenser-Wilkinson appears to have resigned his position on the executive committee, thereby marking his disapprobation of the course pursued. Recently the Navy League held its first annual meeting and the report of the executive committee contained a clause which might be assumed to mean that the present form of naval administration in this country met with its approval. However, when Mr. Spenser-Wilkinson proposed an amendment altering this meaning, it was accepted, and the

League was thus made to apparently endorse his proposals. Attention being called to this aspect of the matter, the executive committee at its next meeting passed unanimously the following resolution: "As apparently, owing to what took place at the recent annual meeting of the Navy League, misapprehension has arisen as to its objects, we desire it to be understood that the main object of the League is not to interfere in the organization of a Government department like the Admiralty, but to spread information as to the vital importance to the British Empire of the naval supremacy, upon which depend its trade, food supply, and national existence, and thereby to ensure to the Government the support of the people for the expenditure necessary for providing an adequate Navy." The result has been that Mr. Spenser-Wilkinson has withdrawn his name from the League, and severed his connection with it.

#### Launch of the "Pelorus."

Sheerness has accomplished a record in the construction of the *Pelorus*, a new third-class cruiser which was launched here with every success, within thirteen months of the date of laying the keel plate. The ship she succeeded on the slip was the *Charybdis*, launched in 1893, but it is to be hoped that so long a period will not elapse before the *Pelorus* is followed by the *Proserpine*, a sister vessel, which is now to be taken in hand. The launch, which took place on Saturday, February 15th, was carried out without the slightest hitch, and with all the customary ceremony, the christening of the new vessel being performed by Mrs. Burnell, wife of the Superintendent of the yard. The *Pelorus* is the first vessel to take the water of a new type of third-class cruiser, an improved *Barham*, of which several specimens will be put in hand shortly, both in the public and private yards. The dimensions of these vessels will be as follows:—Length, 300 ft.; beam, 36 ft. 6 in.; and mean draught, 12 ft. 6 in., with a displacement of 2,135 tons. The steel protective deck, which extends fore and aft, and covers the vitals is 2 in. thick, and the main armament consists of eight 4-in., eight three-pounders and three machine guns, all on the quick-firing principle. The armament is distributed on very much the same lines as that followed in the other cruisers, two of the 4-in. guns being mounted on the forecastle, two on the poop and the remainder on the broadside on the upper deck. There are also two tubes for the discharge of torpedoes. The machinery, which has been manufactured by Messrs. Thomson, of Clydebank, is to be of 7,000 H.P., and will be supplied with steam by eight water-tube boilers of the Normand type. The maximum speed, it is anticipated will be 20 knots, so that in regard to speed and armament the *Pelorus* class will be a great improvement on their predecessors; and if they are the success which there is every reason to believe they will prove, we may expect to have in this class a very handy lot of scouts.

#### Devonport and Keyham.

The one absorbing topic at this station is the extension of Keyham yard, even to the exclusion of prophecies of the new programme. So far, however, the information as to what is to be done is rather meagre, and the commencement of the work, as yet, has consisted simply of the erection of wood fencing to surround the area included in the scheme, which comprises the whole of the land between the north gate of the factory and the boundary of the Naval barracks. Of the two ships building, the *Arrogant* cruiser will almost certainly take the water before the end of the financial year, and the contractors for her machinery are pushing forward, as she is to be ready for commission twelve months hence. The *Furious* cruiser does not make rapid progress, and it will be until the end of the year before she is ready for launching. The *Renown* battleship is the centre of activity, and the rapidity with which she is being completed is likely to have been unequalled in the port. It is not yet settled when she will actually be finished, but it should not be long before the date can be approximately fixed. The *Talbot* cruiser is also making good progress, and the refitting work of the *Phaeton* and *Conquest* proceeds at a good rate. It is a source of great satisfaction to everyone in the yard that we are at least to have a battleship to build, and the decision of the Admiralty in this respect is looked upon as the forerunner of a great extension of the work in the yards and also of the yards themselves, for, with the increased size of the vessels in hand, new plant must be supplied and new methods adopted. The *Hyacinth* is to come here to pay off, but this is the only vessel that is expected for some time to come, nor is there any immediate prospect of any new

ships being put in commission for this dockyard. The odd jobs connected with the torpedo-boat destroyers have now nearly all ceased, and although the boats now and again pay a visit from the Channel Squadron, or those of the instructional flotilla put in an appearance, none of those visiting the yard have yet wanted anything serious in the way of repairs.

#### The Relative Strength of Navies.

The Parliamentary return giving the comparative strength of Navies, to which we referred last month, has been the cause of considerable comment and criticism. It will doubtless be made the basis for discussion when the new programme of shipbuilding is revealed by Mr. Goschen in the House of Commons. The point to which we wish to direct attention here is the number of vessels which the principal Sea Powers maintain in commission, or rather, did maintain in commission at the time the return was compiled, although several of the Powers, including this country, have increased their sea-going fleets since that date. According to the return, the following were the number of vessels of the battleship and armoured coast defence ship classes which the six principal Sea Powers had under the pennant when it was compiled:—Great Britain, 69; France, 48; Germany, 36; Russia, 35; United States, 28; and Italy, 15. This statement gives a very different aspect of the naval dispositions of the several Powers to that which has generally obtained credence. Rightly or wrongly, Italy has generally been credited with the position of the third most powerful Sea Power, but from this return it would appear that Germany has come into that position, and that the United States makes a much better show than has been popularly given to her. We are inclined to believe that this method of comparison does not, on the whole, provide a very trustworthy guide to the actual relative strength of the different navies, and that in the numbers quoted above some other vessels are included as well as battleships and coast-defence ships. From another and later source we place the figures thus:—Great Britain, 81; France, 19; Germany, 14; Italy, 8; Russia, 6; and the United States, 1. Even if we accept these figures as accurate, they show that it will never do for us to relinquish our position of supremacy by concluding that, because we have rebuilt the fleet with the Naval Defence Act of 1889, it is now time to lay on our oars. The margin of superiority is too small altogether, and as it is universally acknowledged that we can build cheaper and quicker than other nations at present, it will be well for us to get to work at once, and increase that margin to a point which will make other nations less sanguine of removing it.

#### Woolwich Dockyard.

It is reported that this ancient yard, the oldest in the kingdom, will, in all probability, be once more taken over by the Navy and used for its legitimate purpose. At present it is utilised at a depot for army reserve stores and hospital supplies; but it is now proposed to erect repairing machinery of modern type in the shops and to recommence shipbuilding on a small scale in the covered slips, in which carts and waggons are now stored. A further proposition includes its utilisation as a recruiting station for the Navy, with a drill shed for reserve men. Woolwich Dockyard covers an area of thirty-six acres, and has a graving dock capable of taking in vessels of the following dimensions:—Length, 300 ft.; beam, 63 ft.; and draught, 26 ft., so that it would be useful for some of the second-class cruisers, if not larger vessels. It is, not however, so much for ships of this size that the yard might be utilised with advantage, but its great value would be shown by its capacity for building torpedo-boat destroyers or for the repair of similar vessels in time of war. It would not be any great cost to lay down new plant and machinery, for the shops are quite ready for use as they now stand. The re-opening of the dockyard would also give an impetus to the Thames shipbuilding industry, which is much wanted at the present time. So late as the Russian war quite large vessels like the *Royal Albert*, a three-decker of 120 guns, were built in this yard, with several frigates and many gunboats. It would certainly make a very central recruiting station for the Navy in London, and the *President* might be moored there from the West India Docks or a newer vessel substituted for that old hulk. A correspondent who has pressed the consideration of this subject on the naval authorities writes:—"It seems surprising that the capital of a kingdom whose very existence depends on the Navy, and which has a population of over five millions, should allow this ancient dockyard to go to rack and ruin, while the nation is practically

squandering money in trying to tinker up docks in places where the foundation is faulty, or where erosion from the inroads of the sea is taking place, as in the Isle of Sheppey."

#### Mishaps to Torpedo-Boat Destroyers.

Many of the torpedo-boat destroyers which have been recently commissioned, have sustained serious injury to their machinery when running at high rates of speed. The *Havock* carried away a connecting-rod bolt in one of the intermediate pressure engines, with the result that the top and bottom ends of the steam cylinders of this engine became knocked out, and some damage was also done to the condenser. Fortunately for the safety of the boat and those on board, the engine-room staff succeeded in effecting a temporary adjustment of the damaged engine by disconnecting the intermediate cylinder and its working parts and in coupling the high and low pressure cylinders, by which means the boat was brought into Portsmouth yard for repairs. The mishaps to the *Swirl* torpedo-boat destroyer, also attached to the Channel Squadron, was not quite so serious. A large crack developed in the high-pressure slide valve casing of the port engine, and the boat has had to go into the dockyard's hands to get this cylinder replaced. The third boat to come to grief was the *Daring* which is employed as one of the Portsmouth instructional flotilla. This boat was at anchor off Dover pier when another vessel ran into her, smashing a large hole in the port quarter of the destroyer. The ward-room filled with water, and the boat was a good deal knocked about, but the pumps and steam ejector were got to work and she was made ready for the run to Portsmouth. On her way there, however, the crosshead of the starboard engine broke up, and the vessel had to make the rest of the passage with one engine only. On each occasion the crews of the boats have acted with commendable promptitude and energy, and a catastrophe which in such flimsy craft might easily happen in the circumstances, has been avoided. One thing has been made plain by mishaps like these which have occurred to the *Lightning* and *Daring*, and this is that these boats, although of such slight scantling and apparently of so fragile construction, have a very large margin of structural strength, and can stand a good deal of knocking about. These mishaps also show that the authorities are wise in giving the crews experience in handling their vessels.

#### Sheerness Dockyard.

The launch of the *Pelorus* has been the event of the month and everyone is congratulating Mr. R. Phayer, who was in charge of her, upon the satisfactory nature of the result. The same gentleman also had charge of the construction of the *Barracouta*, *Brilliant* and *Charybdis*. The *Alert*, another vessel built here, will soon pass into the A division of the Medway Fleet Reserve, following the *Torch*. She has been a long while in hand owing to the successive trials to which she has been put. It was at one time thought she would go to the West Indies, but this plan appears to have fallen through. The *Cleopatra* cruiser is still in hand, but the *Egeria* has been put on one side for the time. The *Wildfire*, the Port-Admiral's yacht, has had bilge keels fitted to her while under refit, as she had showed herself to be rather a roller in the seaway. The destroyers *Janus*, *Dragon*, and *Contest* have now been in hand to be fitted with electric lighting machinery, and have been sent back to their work in the instructional flotilla. The report that the *Sanspareil*, port guardship, would go to the Mediterranean to relieve the *Collingwood*, turns out to be a mistake, and a new crew will be sent out instead. The trials of the destroyers *Opossum* and *Porcupine*, built respectively by Hawthorn & Leslie and by the Palmer Shipbuilding Co., have taken place, and these vessels, having developed trifling defects, they have been in the yard for repair. The *Opossum's* steam steering gear broke down but otherwise her trials were in every way satisfactory. The *Porcupine* developed a leak in one of her condensers which caused the abandonment of her first trial, but a second one has been entirely successful. The *Dragon* has cracked her low-pressure cylinder, and is now waiting here for another cylinder.

#### Coaling in the Mediterranean.

Ships never come together in the present day without the reflection arising: "Oh, for the old sail and spar drills, which excited rivalry and emulation amongst their crews, and made for that smartness which is at once the glory and usefulness of the seaman!" However, other days, other ways, and now there is at least one "evolution" in which the ship's companies have a chance for distinguishing themselves, and showing, that they can do a job of work quicker than their

comrades on other vessels. Coaling ship is a dirty job, but when it is proceeding there is a relaxation of discipline, and Jack is allowed a little more liberty than at other times, in ways that he likes. So if he gets half a chance he sets himself to work, and although it strikes an outsider as odd kind of work to give to a trained seaman-gunner and torpedo-man, he does put his heart into it as he used to into crossing yards and shifting sails. Recently, in the Mediterranean, the ships of the squadron under Admirals Sir Michael Culme-Seymour and Domville, have had several opportunities afforded them of showing their prowess in this direction, and the following schedules of time is not without interest:—

Ship's Name.	No. of tons of coal shipped.	Time coaling. Hours.	Average No. per hour Tons.
Ramillies ..	480	4	120
Trafalgar ..	400	3.6	104.7
Cambrian ..	290	4.2	69.5
Hood ..	280	3.7	65.7
Vulcan ..	209	4.7	48.7

Of course, in looking at the above figures, there are several things to be taken into consideration; all ships are not alike in construction, design, or arrangement. The position of the bunkers makes it easier in some ships to coal quickly, and makes it in others almost impossible to do so. Then the *Cambrian*, for example, is a cruiser, and has not the same number of men as the *Ramillies*, a fact which might tell immensely if working from several lighters. But the emulation created is beneficial, and all ships ought to get their times of coaling published.

#### Pembroke Dockyard.

It seems pretty certain that the Admiralty officials sent down here to decide upon the construction of a new jetty have made a favourable report, and seeing what extensive improvements are being made at other ports, it is confidently anticipated that Pembroke will come in for a share of patronage when the Estimates appear. The jetty was regarded as a temporary expedient or alternative to a dock, but there are some reasons for believing that both dock and jetty will be provided, in which case the latter would come in most usefully for coaling purposes, for which the facilities at present are none too great. If the yard is ever to be used for fitting-out purposes, a basin would be needed as well as a dock, but there are no indications at present of the authorities going as far as this. The *Hannibal* battleship continues to make satisfactory progress, her sides to the height of the main deck are now in place, and the armour-plating of the barbettes has been put on and secured. Workmen are preparing the launching ways, and the mechanics from Messrs. Harland & Wolff, who have the contract for her machinery, are engaged in boring out the shaft brackets. It is said that the engines will be fitted on board at this port, and such a course would be most economical. The frames of the *Andromeda* cruiser and her stem are in place, and below the protective deck the vessel is now put together, which is an achievement to be proud of, seeing that it is not more than two months since her keel plate was laid. Her phosphor bronze stem, which weighs 12 tons 18 cwt., was cast at the foundry here, but the stern post has been made by contract. It is fully expected that another battleship will be allotted to this yard in the programme which we are all anxiously expecting.

#### Launch of the "Desperate."

On the same day that the *Pelorus* cruiser was put into the water a new torpedo-boat destroyer was launched from Messrs. Thornycroft's yard, at Chiswick, and named the *Desperate*. This vessel is one of the new 30-knot boats, of which Messrs. Laird, at Birkenhead, have recently launched three specimens. They are both longer, larger and faster than their prototypes, and will, for this reason, have better habitable qualities, and show an improvement in their sea-keeping powers. The *Desperate* is 210 ft. long, with 19 ft. 6 in. in beam, and is about 300 tons displacement. Steam for her engines will be supplied by three Thornycroft water-tube boilers, having two funnels, and the machinery will indicate 5,400 H.P. Unlike the earlier torpedo-boat destroyers, she will not have a ram bow, but the stem will slope away as in the old-type frigates; and with more flare to the bows, she is expected to rise in the water when driven at high speeds. She carries a rather heavier armament—six guns—than the earlier destroyers, and bids fair to be a formidable antagonist for any torpedo-boats she may overhaul. Her trials will take place this month.

### NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from January 28th, 1896, to February 22nd, 1896:—

Anderson, Arthur R., engineer to the *Vivid*, additional for the *Spider*, undated.  
 Baker, Alexander, engineer to the *Victory*, additional for the *Suriy*, to date February 6th.  
 Bath, G. C., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.  
 Bath, George C., chief engineer to the *Vivid*, additional for the *Antelope*, to date January 2nd.  
 Blundell, Stephen H., staff engineer to the *President*, additional, to date January 25th.  
 Coope, William T., fleet engineer to the *Vivid*, additional for Reserve office, to date February 8th.  
 Conper, Ivie A., fleet engineer to the *Galatea*, to be detailed for duty in the *Calliope*, to date February 1st.  
 Davies, William J., engineer to the *Vivid*, additional for the *Curacoa*, undated.  
 Denbow, W., engineer to the *Royal Sovereign*, for the *Sunfish*, undated.  
 Featherstone, Walter J., chief engineer to the *President*, additional, to date January 25th.  
 Finch, J. J., inspector of machinery, has been promoted to the rank of chief inspector of machinery in Her Majesty's fleet.  
 Gyles, David J., fleet engineer to the *Galatea*, to be detailed for duty in the *Iris*, to date February 1st.  
 Gyles, David J., fleet engineer to the *Victory*, additional for the *Calliope*, to date February 8th.  
 Huddock, S. G., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.  
 Haddock, Sidney G., chief engineer to the *Satellite*, to date January 24th.  
 Ham, John W., engineer to the *Victory*, additional for the *Havock*, undated.  
 Hart, A., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.  
 Hart, Alfred, chief engineer to the *Hibernia*, additional for the *Sandfly*, to date January 1st.  
 Hughes, Thomas, fleet engineer to the *Pembroke*, additional for floating factory *Chasseur*, to date February 8th.  
 Hulford, C. F., fleet engineer, has been placed on the retired list with permission to assume the rank of inspector of machinery.  
 Hyde, Thomas H., staff engineer to the *Victory*, additional for the *Imprieuse*, to date February 21st.  
 Jeffery, George H., assistant engineer to the *Pembroke*, to date February 7th.  
 Jones, R. W., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.  
 Jones, Richard W., chief engineer to the *Vivid*, additional for the *Lynx*, to date February 2nd.  
 Kerr, Alexander, chief engineer to the *Victory*, for the *Melpomene*, to date February 8th.  
 Langmaid, Joseph, staff engineer to the *Vivid*, additional for the *Flora*, undated.  
 Monk, Joseph, fleet engineer to the *Galatea*, to date February 1st.  
 Paterson, Jas. A., assistant engineer to the *Mersey*, additional for the *Onyx*, to date February 13th.  
 Phillips, Richard, chief engineer to the *Vivid*, additional for the *Doris*, to date February 10th.  
 Rice, J. D., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.  
 Robertson, Gordon, assistant engineer to the *Vivid*, to date January 10th.  
 Salmon, C., fleet engineer, has been placed on the retired list, with permission to assume the rank of inspector of machinery.  
 Sanders, William C., engineer to the *Majestic*, to date February 13th.  
 Spry, Frederick, M.D., engineer to the *Undaunted*, to date February 13th.  
 Thomas, Elijah, staff engineer to the *Pembroke*, additional for general duties in Dockyard Reserve, to date February 8th.  
 Tomau, Richard W., engineer to the *Pembroke*, additional for the *Foam*, to date February 3rd.

Tompkins, Albert E., engineer to the *Magnificent*, additional for the *Decoy*, to date February 6th.  
 Walker, James J., staff engineer to the *Pembroke*, additional for the *Cleopatra*, to date January 30th.  
 Weeks, G. H., fleet engineer, has been promoted to the rank of inspector of machinery in Her Majesty's fleet.

### HOAR & BROWN'S HARDWOOD MARKET REPORT, FEBRUARY 20th, 1896.

TEAK.—	Timber.	Planks.	Blocks.	Total.
	Loads.	Loads.	Loads.	Loads.
Stock, 31st Jan.	6,304 ..	2,834 ..	105 ..	9,243
Landings ..	2,865 ..	185 ..	— ..	3,060
	9,169	3,019	105	12,293
Deliveries ..	1,136 ..	195 ..	5 ..	1,276
Stock, 14th Feb.	8,033	2,884	100	11,017

The market has reached a somewhat excited state, and most of the forward supplies to arrive within six months have been bought up. Orders have been booked for large quantities which will be delivered from London during the next few months. These will no doubt very much reduce the stock, and a further rise in prices may be expected to follow. It is difficult to obtain quotations from the other side for forward delivery within the next twelve months, owing to the belief that several large orders are about being given out for building operations.

Planks have not advanced in price to the same extent as logs, although quotations have slightly stiffened. The stock is really larger than the demand requires.

**MAHOGANY—HONDURAS AND MEXICAN.**—Prices gradually creep up, especially for sound straight logs, and values have become so advanced that a reaction is not unlikely to set in, should importations be announced to any great extent. At present there appears to be a large demand for panel-making logs, and long prices are being paid for these; also sound 18 in. wood of all classes is much sought after.

The continued disturbance in Cuba keeps up the price of this description, although there has not been any active demand excepting for medium parcels.

Spanish is selling fairly cheap considering the size in conjunction with the prices ruling.

**CEDAR.**—Values have advanced to about record, and those who have been using this wood are turning their attention to substitutes.

**WALNUT LOGS** are having a good time, as parcels have advanced at least 30 per cent. in value. Lumber is still at the old figures.

**KAWRIE PINE.**—Importations have fallen off lately, and stocks become lighter. Very poor prices have been obtained and the slow demand prevents any upward movement with this wood.

**SEQUOIA.**—Some considerable orders have been placed lately, showing that the present prices are attracting purchasers.

**ROSEWOOD.**—Values have advanced, and stocks are small. Importations have for some time practically ceased, the demand being so light.

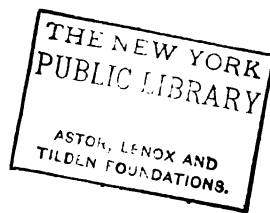
**WHITEWOOD.**—Enquiries are good for both planks and boards, and an advance has taken place all round. Logs do not find purchasers so readily.

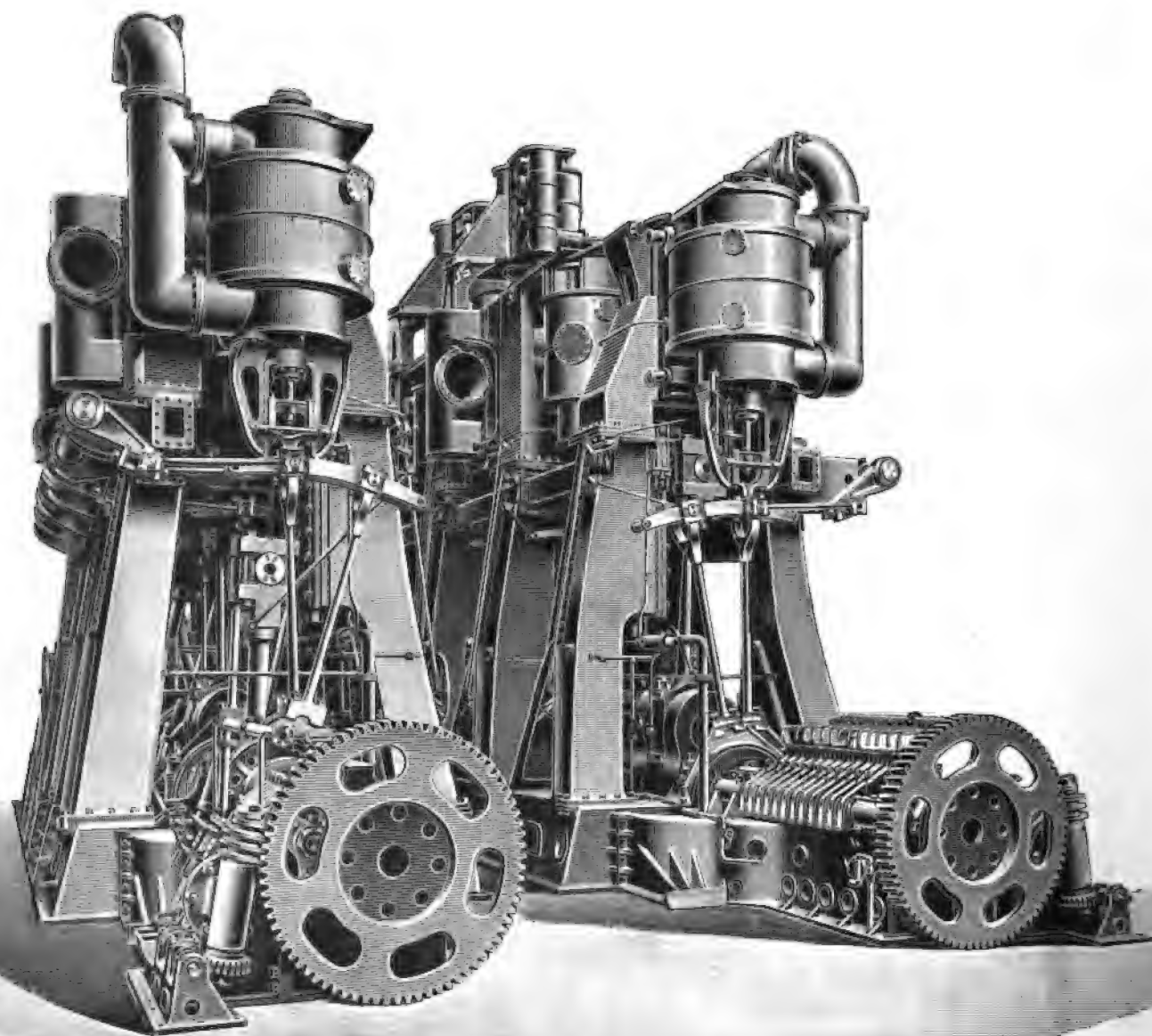
**GREENHEART.**—Stocks are quite large enough for the present demand which equals only a few logs per month, and prices remain fairly steady.

**Mr. J. P. Hall** has resigned the position of managing director of Messrs. John Penn & Sons, Limited, Greenwich. Mr. A. Bletchynden, who for some years was engineering manager for the Naval Construction and Armaments Co., Barrow, has been appointed manager.

**American Steam Navigation.**—A company has been formed at Chicago, with a capital of 10,000,000 dols., with a view to the establishment of a new line of steamers between Boston and Hamburg, stopping at Southampton. It is stated that 25 of the leading grain merchants at Chicago, Duluth, and Minneapolis are interested in the new line.

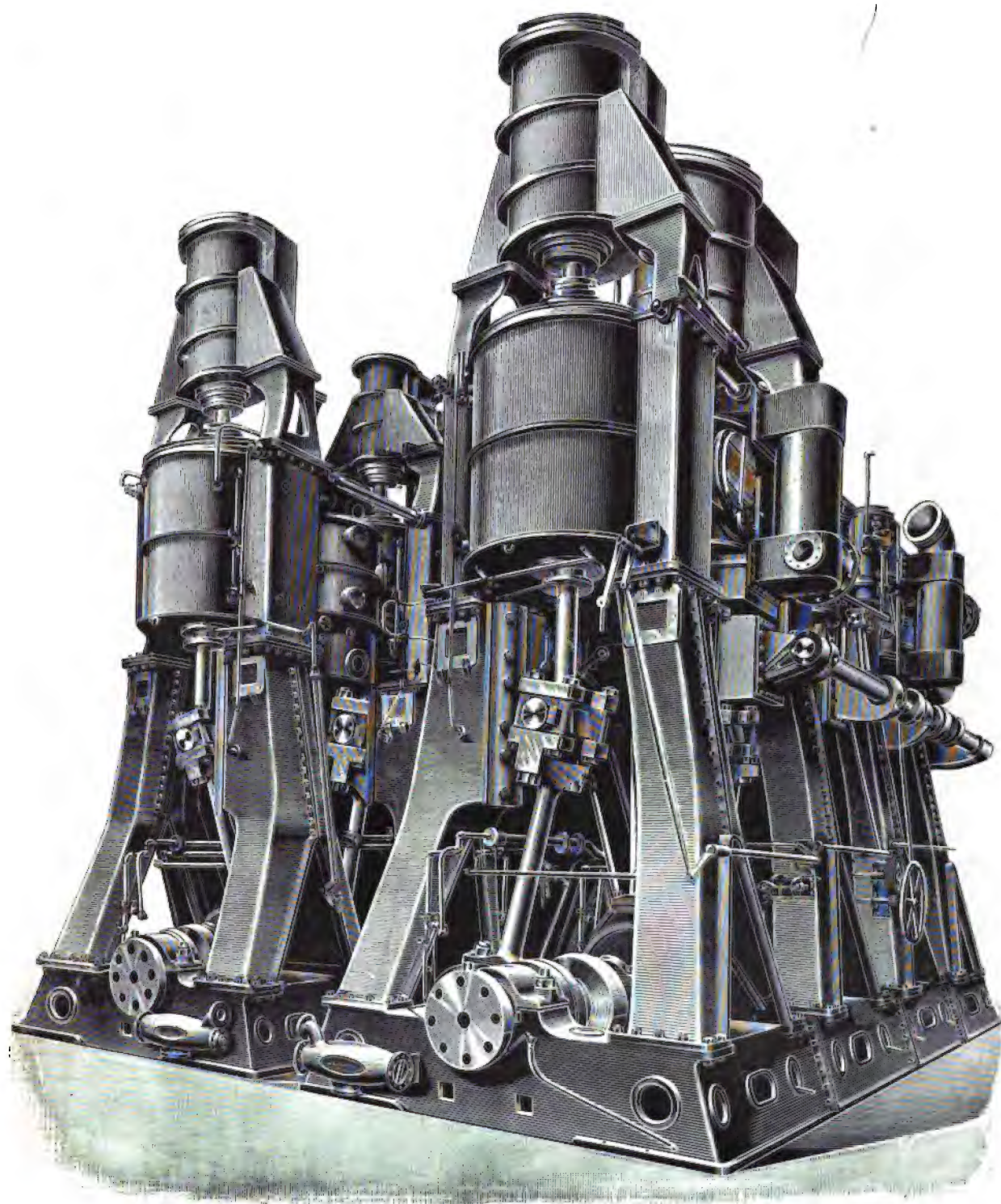






THE ENGINES OF THE AMERICAN LINERS TWIN S.S. "ST. LOUIS" AND

[March 1, 1896.



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## INDUSTRIAL AND TRADE NOTES.

## THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

THE industrial situation in the West of Scotland continues to improve steadily, and the feeling is growing that a long period of shipbuilding and engineering prosperity is assured. The number of contracts placed have not been large, but it is understood that quite a number of enquiries for large steamers are in the market, and will be placed at an early date. Owners were anxious in the early part of the month to cover all possible requirements before the Naval Programme for this country came out, for, as anticipated, its appearance has had an important bearing on the cost of production. Steel makers, owing to the strength of their position, and the favourable nature of the outlook, have been very stiff at the late advances, at which business has been repeatedly done. Since the commencement of the year, many excellent orders for material have been placed, particularly for manufactured steel and iron, and at the time of writing, negotiations are proceeding for the conclusion of some very heavy contracts in steel. All the steel works throughout Scotland are extremely busy; indeed, in one large establishment the workmen rebelled during the month against the long hours they were required to work, although paid by the hour. The malleable iron trade, which was somewhat quiet at the beginning of the year, has experienced an improvement of demand during the past month, and the belief is that the previous dullness was due to merchants holding back orders to see how far down they could get prices. Prices are, however, up from 2s. 6d. to 5s. a ton, and inquiries are much more plentiful. All classes of engineers, marine and land, are busy and well booked ahead. Boiler-makers have also a lot of work in hand, and all branches associated with copper are pressed with orders. After the break-out of trouble in the Transvaal, there was an almost entire stoppage of orders for material for that quarter, but inquiry is now reviving, which is the best evidence as to the more settled condition of affairs prevailing there. Australia is buying both steel and iron more freely from this district, and some large orders are in the market for India. The only branch of trade which is not in the condition that masters and men desire, is the coal trade. It is very active, a heavy consumption proceeding; but as the output, on account of the opening up of several large collieries, is far ahead of even the existing large demand, prices are poor, and producers are grumbling. But their loss is the gain of trade in general for probably nothing does more to stimulate trade than cheap fuel.

A further practical demonstration of the invention of Mr. James Patterson, of Glasgow, for the purpose of preventing smoke, took place at the works of Messrs. Matthew Paul & Co., Levenford Works, Dumbarton, towards the end of the month. A description of the apparatus was given in these columns a few months ago, but since that time considerable improvements have been made. The experiments were of a most successful kind, no smoke having issued from the chimney except when the boiler was stoked, and even then, scarcely discernible. The patent has a twofold object in view—the prevention of smoke and the removal of the detrimental materials in the smoke to the drains. The chief advantages are that as each boiler does fully two-thirds more work than a boiler under the ordinary system, there is a saving in the capital of expenditure, and as the fan does away with the need of high chimneys or funnels, this expenditure is also saved, besides fewer stokers being required. It is not contended, however, that less coal is required, indeed, even more is used, but as the combustion is so complete, more power is obtained and there is nothing wasted. This system is specially applicable to marine boilers; and here the peculiar advantages are the entire prevention of the ashes and smut ejected from the funnels with forced draught, and an increased output per ton or per cubic foot of boiler and fittings without damage resulting either to fans or boilers, and a large reduction in weight and space occupied by fans and accessories as compared with other systems of suction draught. The patent has been favourably reported on by Admiralty officials, and several applications by large steam users have been made for the apparatus. The invention has been patented abroad, and we believe a company is being formed for the purpose of introducing it into foreign countries.

Greenock is to be commended for the part it continues to play in connection with the defenses of the Clyde, and more particularly in regard to their Government dock proposal. This subject continues to occupy the minds of the public men in Greenock, to the exclusion of almost every other. For a long time past, the want of a graving dock in Scotland, capable of accommodating all classes of Her Majesty's ships, has been persistently urged by the harbour authorities and public men of Greenock, mainly in the hope of extracting from the Government substantial aid in modernising and enlarging the present Watt Graving Dock, or in the formation of an entirely new dock of the largest dimensions, and it would not appear that their desires in the matter are likely to be fulfilled. The claims of Greenock as the best site have been strongly urged upon the Admiralty, Sir Thomas Sutherland, M.P. for Greenock, Col. J. M. Denny, M.P. for Kilmarnock Burghs, and many other members for the West of Scotland divisions, having actively interested themselves in the matter. It may be asked, what great need is there for a new graving dock on the Clyde when the new Cessnock Dock is so near completion? It is perfectly true that this dock will be the longest in existence—800 feet from the inside face of the caisson—but the depth at the entrance will only be 26 ft., which will be inadequate for the admission of first-class battleships. Vessels of the *Royal Sovereign* class might be accommodated, but only after being lightened by removing coals and other moveable weights. There is no likelihood of the dock being further deepened either, as any attempt of this kind would jeopardise the foundations of the other two graving docks closely adjacent. The long, tedious, and comparatively confined river between Greenock and Glasgow is a further serious drawback, and still another is the fact that the entrances to the Cessnock Dock and to the Queen's Dock are situated at the same spot. The movement of shipping at this part is thus certain to be attended with more or less difficulty, and more so as all the work has to be done within an hour or two of high tide. There would thus appear to be great force in the contention that all considerations point to Greenock or its neighbourhood as the *sight par excellence* for the contemplated Government dock.

No sooner is one labour dispute amicably settled than others arise to thwart the prosperity of the shipbuilding and engineering interests. A mass meeting of the patternmakers employed in the Clyde district was held early in the month to consider the wages question. The meeting was private, but at the close it was officially stated that after a discussion which lasted over two hours, it was unanimously carried that the employers should be asked to concede to an advance of a halfpenny per hour. The minimum wage at present is 7½ per hour. In the event of the demand being refused, the society's intentions are not yet definite, but it is hoped that a strike at least will be averted. The number of men affected is about 800.

The sixth annual meeting of the British Corporation for the Survey and Registry of Shipping was held at the beginning of the month in the offices of the Corporation at 69, St. Vincent Street, Glasgow—Mr. Nathaniel Dunlop in the chair. The attendance was large, members coming from all parts of the country. After minutes had been read and other uninteresting business had been transacted the chairman addressed the meeting. He remarked that the society had now grown out of its youth and as associations go, was in fact growing venerable. The society is now known throughout the country as a vigorous corporation doing an important work among the shipping of the kingdom. Coming to the work of the past year, a large increase in the number of vessels built exclusively to the Corporation's class and rules is noticeable as compared with the previous year, a considerable addition being thus made to the register. Load lines have during the past year been assigned to about one-quarter of a million tons of shipping, which also marks a substantial increase over the work of the previous year in this department. The outlook for 1896 is most promising, the actual work in hand in new vessels being almost equal at the present time to the total new vessels for the whole of 1895. Mr. Anderson, the chairman of the Finance Committee, submitted statements showing the financial position of the Registry, which was shown to be in a very satisfactory condition. Mr. Denny, as chairman of the Technical Committee, referred in detail to the technical business of the past year; the satisfactory working of the rules and to the very efficient services rendered by the various members of the staff. The meeting was also addressed by Mr. G. B. Hunter, of C. S. Swan & Hunter, Limited, Newcastle-on-Tyne;



Mr. Hugh Hogarth, Mr. G. S. Clark, of Belfast; Mr. William Hamilton, Mr. Craig, Mr. Maon and Mr. H. J. Watson, all of whom referred to the very excellent work which had already been done by the Corporation in the best interests of shipping; both shipowners and shipbuilders concurring in the view that vessels built to the classification of the registry, whether designed for passenger service or as purely cargo boats, could not be excelled for strength, sea-going qualities, and general efficiency.

The time for the returning of tenders for the new cruisers of the *Pelorus* class has been extended by a fortnight to give the builders in this district, who were later in receiving invitations to submit offers, a fair chance of making up prices. While the builders have been supplied with drawings of the ship, the design of the machinery has been in a measure left in the hands of the tenderers, and they may submit for approval any design of water-tube boiler. Messrs. Thomson, of Clydebank, who are building the machinery of the *Pelorus*, launched from Sheerness, is adopting the Normand boiler; while in the sister-ship, the *Proserpine*, the Thornycroft boiler is to be fitted. This will be the largest British vessel fitted with this latter steam generator, although bigger foreign ships are working with it.

The elaborate letter published in the *Times* early in the month, and signed Mr. A. F. Hills, the chairman of the Thames Iron Works and Shipbuilding Co., Limited, in reply to Mr. Goschen's very cogent reasons for the Admiralty practice of giving orders to the most favourable tenderer, has caused considerable amusement in this district. It might be allowed to pass unnoticed were it not for the fact that it contains several inaccuracies. In the first place, while pretending to give the lowest tenders he gives the price for the three cruisers of the *Diadem* class—those last ordered—as £312,000 for hull, and £112,000 for engines. This price is really the highest. The middle price—that paid to the Barrow Co.—was £292,000 for hull, and £139,600 for engines. Thomson, Clydebank, got more, Fairfield less, but that is not very material. Mr. Hills remarked that the first-class cruiser *Terrible* was given to a Clyde firm, whose price for hull and rigging was £2,000 more than that of the Thames firm. He also says that the London builders' compulsory wage expenditure was £32,400 more than their successful rivals. We know not wherein there is compulsion, and Mr. Hills does not tell us by what process he makes up the amount of the difference on the compulsory wage. This, however, is clear, that had the *Terrible* been ordered from the Thames Co. instead of from Thomson, it would have cost at least £12,600 more, for, owing possibly to the internal arrangements at Clydebank, and the allocation of departmental charges, their hulls are relatively slightly higher in price and their engines less than others. Thomson's engines were £15,000 less than the cheapest engines which the Thames or the Admiralty companies get for their ships. Again, the building of ships and engines in the same yard, reduces Admiralty charges for supervision—a fact, also in the favour of the Clydebank price. Mr. Hills surely takes the Lords of the Admiralty to be philanthropists, instead of a body of officials responsible to the country for the prudent expenditure of the money voted by Parliament. They are bound to go for their ships of war to the best market—to the yards where they will be constructed most efficiently and most economically. If the Thames builders can do this, then the Thames will certainly get the orders. But, unfortunately, facts are against their claims. The builders favoured on the Clyde (and on the North-East Coast of England) are firms who have devoted special attention to the building, not of warships only, but of the greatest and the swiftest of ocean liners. For these purposes, they have expended an immense capital in plant of the most modern type and in labour-saving machinery, which can be found nowhere else. It is mainly on this account that they are in a position to give the Admiralty better value for their money than can be given on the Thames. Mr. Hills' innuendoes as to sweating on the Clyde may be dismissed as worthless. All recent experience tends to show that the shipbuilding firms on the Clyde resorted to by the Admiralty are quite able to look after their own interests in this respect. Energy and resource are the only means that win the battle of great contracts for the Navy, as well as for the Mercantile Marine. Let Mr. Hills ponder over this. If he and his fellow shipbuilders on the Thames, who imagine they have grievances, will think more about increasing their resources than about the position of their rivals elsewhere they will be more likely to attain the object they have in view. Their desire to get some share of the national work is laudable enough, but they must go

to work on proper lines. If they imagine that Parliament will lend an ear to the agitation as it is at present being conducted they may find themselves very much mistaken.

Within the past few months, the passengers taking advantage of the *Cluthas*—the small steamers which ply constantly to and fro on the Clyde—have increased so in number, that the Clyde Trustees have resolved to start a quicker service. In order to do this, two new vessels will require to be built and Clyde builders will be asked to tender for them at an early date. In nine weeks the income from the *Cluthas* has increased £560, compared with the same period of last year.

Messrs. D. W. Henderson & Co., Meadowside, cast the keel of a big racing cutter about mid-month. The yacht is from the designs of Mr. G. L. Watson, and the owner, it has now transpired, is the Emperor of Germany. The secret has indeed been well kept, nothing having been known about the owner until now. The vessel has been built in the shed occupied a year ago by the *Valkyrie*, and at the time of launching, much of the preliminary work in her construction was well forward and progress towards completion is likely to be much quicker than with former yachts of her class and dimensions. The Emperor's old *Meteor*—the history of which, once the America Cup challenger *Thistle*, is too well known to need recapitulation—has been handed over to the German Navy as a training vessel, and henceforth she will be known as the *Comet*. The new *Meteor*, an improved *Britannia*, will in all probability make her *début* at the early Thames matches, where she will help to swell an exceedingly smart class, viz., *Britannia*, *Ailsa*, *Satanita*, and possibly *Valkyrie III*. Messrs. Henderson received an order for a large steel steam yacht during the month. Mr. G. L. Watson will be the designer, and it is understood that the vessel is for an American gentleman.

Messrs. J. & G. Thomson, Clydebank, secured an order from the London and South Western Railway Co. early in the month, to build a twin-screw steamer to take up the run between the Channel Islands and the French Coast. Work at the Clydebank yard is in abundance, there being no less than eight war vessels on their stocks at the present moment. In the engineering department, considerable energy is being expended on the machinery of the *Pelorus*, which is to be launched shortly at Sheerness, and it is expected the machinery will be delivered early in March.

Messrs. A. McMillan & Son, Limited, Dumbarton, received orders early in the month to build a small steamer for a firm of shipowners in Hull. Messrs. McMillan secured another order during the month to construct a sailing vessel, which is to be a duplicate of the *Perseverance*, launched by this firm a short time ago.

Messrs. Caird & Co., Greenock, early in the month contracted with the Peninsular and Oriental Co. to build a twin-screw cargo steamer of 8,500 tons carrying capacity. The new vessel will be 450 ft. in length, 50 ft. in breadth, and 33½ ft. in depth, and engines will be provided by the builders capable of driving the steamer at a fast rate. Messrs. Caird & Co. have at present on the stocks the steamer *India*, of 8,000 tons and 11,000 H.P. for the same company, and two mail and passenger steamers for the Pacific Steamship Co.

Messrs. Paul Jones & Son, Greenock, booked an order during the month to build a medium-sized steam yacht, to be ready for launching early in the summer. She will be a tastefully got-up boat in the matter of detail, both internally and externally, and will be fitted with compound surface condensing engines. The yacht is to the order of Mr. Neill, of Glasgow. Messrs. Jones further contracted to build a couple of centre-board boats, somewhat after the design of the four centre-boards they turned out last winter. The new boats will be owned in Dublin, and sailed in the midget classes in Kingston harbour.

Messrs. Charles Connell & Co., Scotcetoun, secured an order about mid-month to build two screw steamers for the Eastern trade to the order of Messrs. G. & J. Weir, Glasgow. The vessels will measure about 2,000 tons each, and the engines will be supplied by a Glasgow firm.

Messrs. The Ardrossan Shipbuilding Co., Limited, Ardrossan, had an order placed with them about mid-month to build a twin-screw steam yacht, which is expected to be put in the water in the approaching summer. The new vessel is to the order of Mr. Wm. Hutchison, Rothesay. The Ardrossan Co.'s yard has been the scene of considerable repairs of late, and the workmen are at present engaged on a large steamer.

Messrs. The Ailsa Shipbuilding Co., of Troon, booked an order

about mid-month to build a finely-modelled steel screw steamer for the Lochfyne and West Coast fish carrying trade of Messrs. William McLachlan & Co., fish salesmen, Glasgow. Messrs. Muir & Houston, Limited, engineers, Glasgow, will supply the engines and boilers. The vessel, which is to be ready for delivery in June, is to go at a high rate of speed.

## TRADE NOTES FROM THE TYNE, WEAR TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

### THE TYNE.

**Shipbuilding.**—That the prospects of the shipbuilding industry in this district continue to improve, is a fact not to be doubted, and though the improvement is accompanied by an increase in the amount of laid-up tonnage, it is none the less evident. There is scarcely a firm of importance in the district but has booked orders since the opening of the year, and most of the yards present an appearance of as great activity as if the long-expected "boom" had come. It is a singular state of matters, to find the empty berths of the shipyards filling up, while the river is thronged with ships for which there is no work, and it can only be accounted for by the theory which we have before propounded, namely, that the ships of a type that are practically obsolete can no longer be profitably employed for the purposes of commerce, and that shipowners consequently find themselves compelled to put their fleets on an up-to-date footing.

The increase in the number of laid-up ships is not the only discouraging feature in the situation—freights are still abnormally low, and, if anything, show a tendency towards further depression. On the other hand, a steady development in general trade has been noticeable for some time past, the increase shown in the values of exports and imports being conclusive proof of this; and there is also present a stronger feeling in the iron and steel trades, as indicated by enlarged demand and rising prices. The manifest desire of our own and other Governments to strengthen their naval defences, must also be taken into account; and when this is done, we think it will be admitted that, so far as concerns the future of shipbuilding, the balance of evidence favours the more hopeful view.

It is understood that the directors of Sir W. G. Armstrong, Mitchell & Co., contemplate building a number of the cruisers which they have on order at their Low Walker Yard, so as to lessen the pressure at their Elswick establishment. This was quite unexpected, as the Elswick yard has hitherto been used almost exclusively for the building of warships, the Low Walker yard being reserved for mercantile work. On one or two occasions in the past, however, when work was scarce at Elswick and plentiful at Low Walker, the directors wisely decided to transfer some of the work to the former place, and in reversing the process now they are merely adjusting the balance between the two establishments. We believe we are right in saying that this great firm is the only one in existence that has two large separate shipbuilding yards—one for war, and the other for merchant ships—each of which is so well equipped as to be capable of relieving pressure at the other, when the necessity arises.

The Palmer Shipbuilding and Iron Co., Limited, have been commissioned to build another vessel of 8,500 tons capacity for the P. & O. Co. Last year the Jarrow firm built for the same great trading company the splendid steamer *Borneo*, and it is flattering to them as builders that they should be honoured with a second order from the same source. The firm have made a good start with the recently ordered torpedo-destroyers, the keels of four being already in position. They have also a good deal of repair work in hand, their patent slipway and their graving dock being both occupied.

Messrs. Hawthorn, Leslie & Co., having launched the second Russian Volunteer boat which they have in hand, have put down a large vessel intended for the colonial meat trade in the vacated berth. This makes two vessels for this trade now on the stocks, and there is, it is stated, other work in preparation. Messrs. C. S. Swan & Hunter are putting down in their covered berth the large vessel ordered by the Pacific Steam Navigation Co., and other berths in the yard that have

been vacant, are being filled up. A commencement has been made with the erection of a second covered berth in the east yard.

Messrs. Wigham Richardson & Co. have an adequate supply of work to keep their berths filled, and their machinery fully going for some months to come; and at Messrs. Dobson & Co.'s yard the condition of affairs is equally satisfactory. The Tyne Shipbuilding Co. continue busy, with three large vessels on the stocks, and one in the river being fitted out. At Messrs. Readhead's establishment two berths are occupied with vessels in the framing and plating stages respectively, and two with newly-placed keels. This firm have other work to follow, and are exceptionally busy in the repairing department.

The Smiths' Dock Co., of North Shields and Tyne Dock, have a large amount of repair work in hand, among the principal contracts being a general overhaul of hull and engines of the s.s. *Acuba*, belonging to a Sunderland owner. Repairing establishments at South Shields are fairly well employed, but the small shipbuilding yards at this centre are not as busy as could be wished. The three-funnelled steamer *Kharson* has been placed in the Wallsend Slipway Co.'s graving dock for inspection before leaving the port.

**Engineering.**—At the St. Peter's Engine Works the Russian Volunteer steamer, recently launched from the yard of Messrs. Hawthorn, Leslie & Co., is receiving her machinery, and in all the departments of the works considerable activity continues to exist.

The Neptune Engine Works, Low Walker, are busier than for some time past, the firm having received orders for the boilers and machinery of some important vessels now in course of construction at a neighbouring yard. There is also in hand, the engines, &c., for a number of ships building at the Neptune Yard.

At the North-Eastern Engine Works, Wallsend, there is also a good deal of briskness, additional orders having been booked within the month.

The Wallsend Slipway and Engine Works are perhaps less busily employed than at any time last year; but it is understood that the managers are now tendering for Government work, and it is to be hoped they will be successful in securing a share. If the possession of a high reputation and unique facilities for turning out work promptly and economically can be relied upon as helpful factors in transactions of this sort, the chances of the company in connection with this matter must be looked upon as exceptionally good. Among the ordinary contracts in hand at the present time we may mention a pretty extensive overhaul to the engines of the s.s. *Port Philip*.

The Palmer Co.'s Engine Works are just now becoming quite busy, and the outlook for the remainder of the year is excellent, as there is the machinery of six torpedo destroyers, four Hamburg-American liners, and one P. & O. boat, to be dealt with, not to speak of what may follow. The engineering department of Messrs. Readhead's works is kept briskly going, and at Eltringham's Boiler Works, South Shields, there are a good many forward contracts for supplying new boilers to vessels.

Messrs. Donkin & Co., of the St. Andrew's Engine Works, Newcastle, have added considerably to their list of new orders during the month, among the recently booked contracts being several from important firms on the continent. Finding it necessary to further increase the productive capacity of their works, the firm have decided upon putting down an additional supply of new and improved machinery, which they anticipate will enable them to cope effectively with all probable requirements.

The Newburn works of Messrs. John Spencer & Sons are just now showing increased briskness, and all departments are kept running full time. The improved demand for ship and boiler plates that has lately arisen has had a marked effect in quickening business in the plate mills. The firm's Ouseburn works are also well employed, and hopes are entertained that a further stimulus to business will be given ere long.

Messrs. Robert Bowran & Co., of 8, St. Nicholas Buildings, Newcastle, have contracted with Messrs. Cragg & Sons, of Middlebrough, to supply a powerful "Stockport" gas engine (for which Messrs. Bowran are the local agents) for the new yard to which they are removing their business. We hope to have something to say about this new yard in a future number, and will then refer more particularly to the gas engine. The same firm (Messrs. Bowran & Co.) are being very successful in their efforts to extend the use of Magnolia metal throughout the

North, and their sales are more than double what they were at this period last year.

Forge works at Jarrow, Walker, and St. Peter's, show greatly improved business this month, and the steel works at the former place and at Elswick are having as many orders as can be dealt with. Iron foundries are generally well employed, and both brass foundries and copper works are improving. It may be mentioned, in this connection, that the order for 20 bronze propeller blades required for the four Hamburg-American steamers now building at Jarrow (four and a spare one for each ship), has been given to Messrs. Stone, of London, through their local agent, Mr. George Noble, 7, Dean Street, Newcastle.

The directors report to the shareholders of Messrs. George Angus & Co., Limited, which was placed before the annual meeting recently held in Newcastle, was a most satisfactory document, showing as it did successful and increasing business at a time when with many firms the state of business is a subject for complaint. The directors were able, after carrying over a substantial sum to next year's account, to recommend for distribution the handsome dividend of 10 per cent., with a bonus of 10 per cent.; and we venture to affirm that, for a year's working, there are few firms who could show so satisfactory a result. It may be added that the company's works are now well employed in all departments, and the weekly output of goods for both home and foreign markets is fully up to the average. Local orders for the company's well-known engine packings continue to be numerous.

#### THE WEAR.

**Shipbuilding.**—At Sunderland, as elsewhere, there is just now a scarcity of shipwrights. One consequence of this state of things is that the section of workmen named have sent in a claim for a substantial advance of wages. From the shipwright's point of view this action may appear quite reasonable; but it is not in accordance with custom, nor yet is it calculated to promote their own best interests. The employers cannot deal with wages piecemeal—they must deal with them as a whole, or not at all. To give an advance to one section whose claim may appear to have some basis of reason furnishes a pretext to other sections for claiming similar advances whether they have reason or not on their side, and these claims once made must be met either by concession or a strike. The shipbuilding industry at the present moment is in a state which does not permit us to discard all question of doubt as to its future; and though, as we have said in another place, the balance of evidence appears to be in favour of better trade, the better trade cannot come if the way is blocked with obstacles. It would be impossible indeed to imagine any surer method of effectually nipping in the bud whatever prospect of improvement there is, than unduly increasing the cost of production, and it requires not the discerning powers of an expert to see that wages cannot be raised without increasing cost. It is not within our recollection that the employers have ever attempted to reduce the wages of any one section of workmen without at the same time intimating a similar intention with regard to the others; and in spite of the scarcity of their members at this juncture, we think the shipwrights would be well advised to waive their present claim, and wait till the condition of the industry has got beyond the region of doubt, and circumstances render it possible for the question of a general advance to be considered. They should not forget that foreign competition is no longer a myth, and that every year it is becoming more and more of a reality. They will have themselves to blame if, by pressing their claim, the dawning improvement in trade should be checked, and they, as well as others, are again left idle upon the streets.

Of the orders booked upon the Wear this month, the most important have fallen to the share of Mr. James Laing, of the Deptford yards. These consist of four or five twin-screw steamers ordered by a Russian syndicate for Black Sea navigation; and one vessel of superior type, ordered by Messrs. Huddart, Parker & Co., of Melbourne. The Russian steamers are of comparatively small size; but the steamer for the Melbourne firm will be of tolerably large dimensions. There is other work on the stocks, and there is no doubt that the establishment is assured against slackness for the whole of this year.

Messrs. R. Thompson & Sons, whose yard has been only differently employed for some months, are now receiving frame material for a large vessel. The firm are very busy with repair work at their graving docks. Messrs. Priestman & Co.,

Messrs. Short Brothers, and Messrs. Doxford, are all well supplied with orders, and at Messrs. Pickersgill's, where there is at present but one vessel on the stocks, preparations for the laying down of another, are understood to be in progress.

Messrs. Bartram & Sons have launched, within the last few days, a fine vessel ordered by Messrs. Dunlop, of Glasgow, and are now engaged in putting down another large steamer in the vacated berth. The Sunderland Shipbuilding Co. are fairly busy, and at Messrs. Blumer & Co.'s yard preparations for laying down a large vessel are being made. The yard is at present very slack, there being but one vessel on the stocks, which appears to be unsold.

The whole of the berths at the North Sands yard (Messrs. J. L. Thompson & Sons) continue to be occupied with vessels, mostly of large size, and considerable quantities of material continue to be delivered. These facts, it is needless to say, point to the maintenance of the existing briskness throughout the present year.

**Engineering.**—At the Southwick Engine Works (Messrs. George Clark, Limited) a marked improvement in the state of business has become noticeable since last month, the increase of work in the pattern shops being such as to necessitate the engagement of a large number of hands in addition to those previously employed. In the fitting and boiler shops the improvement is also perceptible, but will become more distinct (in these departments) shortly. The firm have received the orders for the machinery of several vessels to be built at Messrs. Laing's yard, and at other establishments on the river.

The North-Eastern Engineering Co., South Dook, have a number of repair contracts in hand, but are not, at the moment, particularly busy in new work. They have just engined a large vessel built by Messrs. Raylton, Dixon & Co., of Middlesbrough, for the Indo-China Steam Navigation Co., to be employed in their Eastern trade. Last year the firm engined two other fine vessels for the same owners, and early in the present year they shipped to China the auxiliary machinery and details (together with new steel boilers) requisite for converting the engines of two vessels from the compound to the triple-expansion type. Among the new engines now in progress is a set for an Australian liner, building at a neighbouring yard.

Messrs. John Dickinson & Sons are engineering the fine vessel *Queen Cristina*, recently launched from the yard of Messrs. Bartram & Sons, and they will shortly have at the quay the 7,000 ton steamer building by Messrs. J. L. Thompson & Sons for Messrs. Rickmers, of Bremen.

Messrs. Doxford's engineering department is well supplied with work, and is likely to be kept so for some time to come.

At the Sunderland Forge, Pallion, work is fairly plentiful, among the orders in hand being a stern frame of peculiar design, for a vessel building at Messrs. Doxford's. One similar frame has already been turned out from the forge for the same builders, and it is no exaggeration to say that its design and workmanship have excited much admiration. The adjoining works of Messrs. John Lynn & Co., are well employed on steering gears and other specialities.

**The Hartlepool.**—With regard to the state of shipbuilding at the Hartlepool, there is not much cause for complaint, as few empty berths are to be seen. The engine works of Messrs. Thomas Richardson & Sons continue to be satisfactorily employed, not only in the marine departments, but also in the departments set apart for the manufacture of Morison's evaporator and other well-known steamship accessories.

The Central Marine Works are also busy, and the managers have been able to send two large vessels on their trials within the past three weeks. The local steel works are kept busy, but at the docks there is very little doing, the timber import season not having yet commenced.

**Stockton.**—Messrs. Bopner & Son have a fair amount of work, completing orders taken when prices—both of material and tonnage—were at their lowest point. It is exceedingly difficult now to get new orders, and it is to be feared that the recent advance in the prices of materials and the unsettled state of the labour market, will have the effect of accentuating the difficulty. Messrs. Craig, Taylor & Co. though not without work, are far from busy, and the firm are not hopeful of booking orders at present, in view of the claims that are being made for advances of wages, which are bound to prevent any possible development.

At the engine works of Messrs. Blair & Co., business is so far fairly satisfactory.

**Middlebro'**.—Messrs. Raylton Dixon & Co. have received from a German firm, during the month, an order for two large steamers. Messrs. Craggs & Sons are removing to new premises, better adapted to modern requirements than the yard they have occupied for such a number of years. We hope to be able to give some account of the new yard and its equipment in a future number. Steel works at this centre are becoming busier, and at some of the foundries and engineering establishments an improvement is also noticeable.

**Darlington**.—It is stated that an iron factory which has been standing idle at this centre for some time is about to be re-started.

The state of business at the Darlington Forge Co.'s works is still good.

**Consett**.—Quite exceptional activity exists at the works of the Consett Iron Co., and the weekly output of plates, angles, &c., continues to be above the average of recent years.

## THE MERSEY.

(From our own Correspondent.)

THE outlook for the future continues to improve, and a period of more or less general activity throughout both the marine and other branches of the engineering industries of this district is being looked forward to with confidence. There is a large quantity of new work stirring or in prospect, and the books of engineers in various branches have not been so well supplied with orders for a very considerable time past as they are now. Some of them, particularly amongst makers of special machine tools for marine work and other heavy requirements, as well as makers of the lighter class of tools, have work already in hand which will keep them fully going during the remainder of the year. As regards raw material there has been a steady upward movement in prices during the month, the most noticeable being in hematites, which have hitherto been hanging back, whilst various descriptions of manufactured steel have also shown a substantial hardening upon late quotations, although steel plates, either for shipbuilding or boiler-making purposes, do not yet show that improvement which had been anticipated to follow the termination of the shipbuilding strike.

Messrs. Laird Bros., of Birkenhead, are making satisfactory progress with the work they have in hand, including a number of torpedo-boat destroyers for home and foreign governments. During the month the firm have launched from their works the *Captain Crella*, which is the first of four 30-knot torpedo-boat destroyers for the Chilean Government, and similar in general design to the boats of this class which Messrs. Laird are constructing for the home Government. It may be added that this vessel was only ordered in August last. The battleship *Mars*, which the firm have in hand for H.M. Government, is to be floated on March 30th. During the earlier part of the month, Messrs. Laird Bros. made some interesting trials at Devonport, on board the *Lynx* destroyer, with the object of testing their new apparatus for automatically regulating the supply of feed water to boilers. The gear was fitted to two boilers, and it was found that in rough weather, with full power, and under all conditions of steaming, the water level in the boilers was well maintained. The *Lynx* is fitted with Normand boilers, and Messrs. Laird have with their new gear apparently solved the problem of regulating the feed supply in connection with water-tube boilers.

The usual monthly returns issued by the principal trades union societies connected with the engineering industries are of a very satisfactory character. The settlement of the recent shipbuilding dispute on the Clyde and at Belfast, and the consequent return to work of the men affected, have been the means of greatly reducing the unemployed list of the various trades union organisations—especially the Amalgamated Society of Engineers—whilst the improved condition of trade throughout the country has also helped to reduce the number of out-of-work members. The Amalgamated Society of Engineers, which has played so important a part in the above dispute, has now only about five per cent. of its total membership on donation benefit, which represents a reduction of about four per cent. upon last month's list, and is only half the percentage indicated in the returns for February of last year. In

this immediate district there is no material alteration as regards the number of unemployed, but what change there is has been in the right direction, and less than four per cent. of the local membership are now on benefit, and in some branches the pressure of inquiries is such that the local secretary finds it impossible to meet the demand for certain classes of workmen. The Steam Engine Makers' Society was not affected to any appreciable extent by the shipbuilding strike; but the recent settlement of the above dispute, combined with improving trade, has brought about a reduction of one per cent. in the unemployed list, there being now only two per cent. of the membership on donation. The reports as to the state of trade are generally of a decidedly encouraging nature, stationary engine builders especially being well employed, a number of additional men having been engaged, but there is still little or no improvement to report from some of the marine centres.

With few exceptions, engineering shops in this district are well off for orders, and a considerable quantity of new work is coming forward, and in prospect. Stationary engine builders, especially in the Bolton district, continue very busy; machine-tool makers are well supplied with work, and the same may be said of machinists. Boiler makers are better engaged than they have been for a long time past, orders for 150 boilers having during the past few weeks been placed with Lancashire firms, about 70 of them having gone into the hands of one large maker. Locomotive builders, as reported last month, are also in a much better position than they have been for a considerable time past.

In the iron trade there has been a considerable weight of buying going on during the month, with a strong upward move in prices both for raw and manufactured material. With the close, however, a quieter tone prevails, as regards pig iron owing to consumers having covered their requirements for the present, and there is perhaps not quite so much firmness as regards iron in second-hands, but no giving way is noticeable on the part of makers, who, in many cases, are indifferent about further orders. In local brands of pig-iron makers have made an advance of 6d. per ton upon last month's rates, and 46s. 6d. less 2½ is now the average figure for No. 8 foundry qualities, delivered Manchester district. Makers have been doing a good business, and prices are 6d. to 1s. higher, Lincolnshire ranging from 42s. to 43s. 6d. for forge to 44s. and 44s. 6d. foundry, net cash, delivered Manchester, with makers so well sold that they have scarcely anything to offer for early delivery. Derbyshire foundry qualities now average about 47s. to 47s. 6d. less 2½ delivered here. With regard to outside brands Middlesbrough has shown a steady hardening tendency, and good foundry qualities have now got up to 47s. 1d. to 47s. 4d. net cash, delivered Manchester, with ordinary G.M.B.'s scarcely obtainable under 46s. 10d. net, delivered. Scotch iron is also higher, although there is rather an easier tone with the close of the month, and Eglinton now averages about 47s. 6d. net prompt cash, delivered Lancashire ports, or 49s. 6d. to 49s. 9d. delivered Dock Quays, Manchester Ship Canal.

In finished iron, orders have been coming forward freely, and although makers have advanced their prices for bars 2s. 6d. per ton, this has not led to any falling off in the weight of business doing. Other descriptions of manufactured iron are without quotable change. Lancashire and North Staffordshire bars now average £5 12s. 6d. to £5 15s. as the minimum, with sheets remaining at £7 10s. to £7 12s. 6d., and hoops £6 2s. 6d. for random, to £6 7s. 6d. for special cut lengths, delivered Manchester district, with 2s. 6d. less for shipment.

A hardening tendency in prices is reported in the steel trade. Hematites, in which some large transactions have been put through, have shown an advance of about 2s. since the commencement of the month, 57s. 6d. to 58s. 6d., less 2½, being now quoted for good foundry qualities delivered Manchester. Steel boiler plates have not advanced to the extent that was anticipated when the shipbuilding strike was settled, but prices are higher than they were, £6 7s. 6d. being now the minimum for delivery in this district, although sellers at £6 5s. could still be found. Steel bars have been advanced 2s. 6d. per ton.

In the metal market business has been brisk all through the month, a good demand coming forward from all the engineering branches of trade. Early on in the month an advance of ½d. per lb. was made on brass and copper tubes, and, with the close, brass and copper wire, brazed brass tubes, and rolled common brass have been put up to a similar extent, whilst there are expectations of a further advance in other descrip-

tions before very long. For delivery Manchester district, list rates are now as under:—Solid-drawn brass boiler tubes, 6½d.; solid-drawn brass surface condenser tubes, 8d.; solid-drawn copper tubes, 7½d.; brazed copper gas and steam tubes, 7½d.; brazed brass gas tubes, 7d.; brass wire, 5½d.; copper wire, 7d.; rolled brass, 5½d.; yellow metal bolts, 5½d.; condenser plates, 5½d.; wrought copper boat nails, 8½d. per lb.

In the timber trade a tolerable weight of business is reported and with imports only moderate, prices are steady, with an encouraging outlook for the future. East India teak is in fair demand at late rates, and greenheart also meets with an active enquiry, with prices firm and stocks moderate.

The position in the coal trade has shown no change from the unsatisfactory condition reported last month. Only a slow demand has been coming forward, and although many of the pits are now on short time, supplies are plentiful. House coals are in very poor request for the winter season, and prices have been barely maintained. Steam and forge coals are also meeting with no really better sale, notwithstanding the improvement in some of the principal coal-using industries, and extremely low prices are ruling. Engine fuel is moving off fairly well at late rates. At the pitmouth, it is exceptional where more than 10s. is being got for best Wigan Arley; 8s. up to 9s. for Pemberton four-foot and seconds Arley; 7s. to 7s. 6d. for common house coal; 6s. for steam and forge coals; 8s. to 8s. 6d. for common slack; and 4s. 6d. up to 5s. for the better sorts at the pitmouth.

A depressed tone still prevails in the shipping trade, business continuing very slow, with prices as low as ever, some of the inferior descriptions of steam coal being obtainable at 6s. 9d. to 7s., with better qualities averaging 7s. 6d. to 7s. 9d. per ton, delivered at the High Level, Liverpool, or the Garston Docks.

### BELFAST TRADE NOTES.

(From our own Correspondent.)

THIS month has presented a notable contrast to the previous four, on account of the great activity displayed in the shipbuilding and engineering trades here. The engineers, as was expected, resumed work on Thursday, January 30th, and night shifts are now running in both Messrs. Harland & Wolff's, and Messrs. Workman, Clark & Co.'s. Large arrears of work in the engine departments have, of course, to be cleared off to get on a working level with the shipyards. The remainder of the moulders received their advance of 2s. on Monday, February 3rd, and started work immediately. Thus, through the intervention of the central council, the disastrous dispute was brought to an end, after a loss to the A.S.E., it is said, of over £40,000. The Belfast executive do not seem to have had enough of it, however, judging by the tone of a bombastic manifesto which they have issued to their brother members in other parts of the country. A few passages from it may not be uninteresting. After disclaiming having evinced "the slightest signs of weakness or demoralization," they designate the action of the central executive as a "blind, frenzied stampede from a field which might, and should have been, one of victory and credit to them all." The executive are also compared to a "Star chamber autocracy." This remarkable document winds up by calling on the members to "set their house in order, and through the agency of our delegates this year, render impossible another surrender of our rights as pitiful and dismal as this has been."

It is a relief to turn from this subject and note the amount of work in hand. Messrs. Harland & Wolff are credited with sufficient tonnage to keep them going for a couple of years, while Messrs. Workman, Clark & Co. have also a fair amount on order. A large steamer, for Messrs. Bates & Co., Liverpool, will be launched on Saturday, 29th, from the Queen's Island, and on the same day the s.s. *Langton Grange*, for Messrs. Houlder Bros., London, from the Belfast shipyard.

Messrs. Harland & Wolff have recently laid the keel of the big Hamburg-American boat they are building, and large consignments of channel and angle irons, of very heavy section, are daily arriving at the quay for her construction. This firm have also in hand a couple of smaller vessels for the same owners. The original order was for three boats, but, during the strike, one of them was cancelled and transferred to the East Coast.

The China Mutual steamship *Hysan* left this port on the 15th.

Fog, unfortunately, prevented a trial trip being run, as the measured mile posts were invisible, but after cruising about slowly for some time, and adjusting compasses, she proceeded to Glasgow to load up for Shanghai, to which port she makes her maiden voyage. She took in as part cargo here some hundreds of tons of old horse-shoes.

Two more new steamers will also take their departure this month, these being the s.s. *Cestrian*, for Messrs. F. Leyland & Co., Liverpool, and the s.s. *Charon*, for Messrs. A. Holt & Co., Limited, Liverpool.

The s.s. *Adanrigh*, owned by Messrs. Clark & Service, Glasgow, which has been undergoing repairs here for the last four or five months, leaves shortly for Glasgow, and thence for Guadalupe to load a cargo of raisins.

The departure of the old White Star steamer *Oceanic* for London, to be broken up, has caused some comment here. The reason alleged for her removal from this port to London, for which she left on the 6th inst., was the high dock dues charged here. As a consequence, the subject has been discussed by the Harbour Board, and a table showing the comparative rates of the principal shipping centres is being prepared for their consideration. It will be remembered that the *Oceanic* is one of the pioneers of the White Star Line.

The old paddle steamer *Earl of Ulster*, which conducted the service between Belfast and Fleetwood for many years, has now been reduced to scrap-iron and firewood.

The Union Co.'s steamer *Scot* has been placed in the Alexandra Dock to have her length increased by 50 ft., and other improvements effected to render her more economical. The work is being done by Messrs. Harland & Wolff, and is being pushed on rapidly.

Messrs. McColl & Co., Limited, have received the order to repair the s.s. *Glenarm*. Extensive repairs are required, which will occupy a considerable time. The smaller repair shops are all well occupied just now.

A cargo of 480 tons of pig-iron from the Glengarnock Iron and Steel Co., Glasgow, is being unloaded at the quay this week. It is consigned to their local agent, to supply their numerous customers in Belfast and neighbourhood.

Altogether trade is brisk, with few unemployed, and this pleasant state of affairs seems likely to continue.

### NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

Barrow.—There are very encouraging prospects in the shipbuilding trade of Barrow. Only one new order has been booked during the month, but there is a distinct improvement in the outlook all round, and not only on British and foreign Admiralty account, but on home commercial account there is a better demand, and indications of a very active future. This fact, and the further fact that prices of material are advancing with every prospect of an advance in workmen's wages, makes builders very chary about entering into contracts at the present quotations for new tonnage. It is remarkable what a small advance has taken place in the price at which some builders are taking ships, with prospects of dearer conditions so marked on all sides, but this is a state of things which may reasonably be expected to check itself before much mischief is done to those concerned. During the month the Barrow Co. tendered for one of two P. & O. steamers, the orders for which have gone elsewhere, and tenders have also been sent in for two of the third-class cruisers which the Admiralty is about to give out to private builders. The work in the hands of the Barrow Co. is making wonderful progress. It is quite expected H.M.S. *Powerful* will be ready for delivery before Midsummer. Her internal fittings are in a forward state, and every effort is being made to push forward to an early completion the features of construction still requiring attention. The tests which have been made of her Belleville boilers have resulted in most gratifying results, alike to the builders and the patentees. During the month H.M.S. *Juno* has received her engines and boilers, and heavy fittings generally. She is in a forward state and will soon be ready for her dock trials. Her sister ship, H.M.S. *Doris*, will be launched on the 3rd of March by the Hon. Miss Hood, daughter of Hon. Admiral Hood. Her engines and boilers are ready and will be put on board immediately the cruiser is launched. The two torpedo-boat destroyers are being put down between



two of the biggest launches in the yard, so that if orders are received which require these big ways, the work of building the bigger craft can proceed without in any sense being interfered with by the new torpedo-boat destroyers, which will be soon launched and out of the way. It is evident the Naval Construction and Armaments Co. intends to lay itself out for a big programme of work, because in many departments important extensions are being made. A new copper shop of very big dimensions is being built alongside the engineering works, and the present copper shop is to be used as a brass moulding shop. This latter department is growing in importance now that all the big warships have their stems and sterns cast in phosphor bronze, or other similar strong metal. The brass-finishing shop is being made double its present size, and the pattern-makers' shop is also being considerably extended. These extensions point to the fact that the management is alive to the importance of having plenty of scope for undertaking big work and securing the plant and conveniences which will keep the establishment quite up to date. As time goes on there is reason to believe that further improvements as necessity arises will be provided at the Barrow works, and smaller establishments outside the yard are also springing up to feed the parent concern.

The launch of the *Clan Menzies* from the Barrow Yard on February 1st, was performed by Miss Joss, daughter of Mr. Joss, a member of the firm of Messrs. Cayzer, Irvine & Co. This is the fourth vessel built by the Barrow Co. for the Clan Line, and the fifth, the *Clan Lindsay*, is now on the stocks, and so far completed that her launch will take place during the month of March. Mr. Cayzer, M.P., in replying to the toast of "Success to the *Clan Menzies*," said there was one thing he noticed in the Barrow yard, and that was that the work was carried on very systematically. No sooner was an order given than the whole arrangements of the ship, hull, engines, and everything else were put in hand. The result was that speedier delivery could be given in this yard, he would say, than from any other yard, even on the Clyde. He was quite in a position to speak on this matter, because having built something like 40 vessels he had seen and experienced the great loss by delay in construction. As a rule, shipbuilders ordered vessels in bad times, and expected they would have them ready when the good times commenced, but he had known occasions when the anticipated period of good trade had expired before the vessel was delivered. Such, he believed, would never be the case with this yard, for he did not think—and he did not wish to say it because the organiser of the whole was there, but because he believed it—there was no yard in the kingdom where the work was more regularly put in hand and carried out than in the Barrow yard. He had alluded to the ship-owning part of the question, but there was also the shipbuilders' part. He could safely say, and he believed if he was surrounded that day by shipbuilders generally, they would confirm the statement, that there was more profit to the shipbuilder when he could turn out vessels quickly and expeditiously. The longer a vessel remained in the yard, men were employed upon her, and this added to the cost of the ships. The sooner they could turn her out the better it was for the company and for the shareholders. He thought they might see that result would be proved here, and that not only would it benefit shareholders but benefit the district at large, because, following his argument, if the work could be done quickly, it could also be done cheaply, and that would place Barrow in the position of competing with other shipbuilders in the kingdom. He often said to his friends in the north when they chaffed him as they often did about coming south to build ships, they had a magnificent concern at Barrow, in the building yard, its engineering shops, and its boiler works, they could put one or two big concerns on the Clyde. In response to some of his friends on the Clyde who were credulous about this place, he asked them to visit Barrow and prove for themselves whether what he said was true. The *Clan Menzies* immediately after her launch secured her masts at the Ramadan Dock. During the following week her engines and boilers were put in, and on the 21st ult. the dock trials, which were in every sense satisfactory, took place. Since then Messrs. Cayzer, Irvine & Co. have placed the order at Barrow with the N.C. & A. Co. for another steamer similar to the *Clan Menzies*, with the exception that she will be 14 ft. longer. This vessel will be laid on the same keel as the *Clan Menzies*.

**West Cumberland.**—There is still very great steadiness in the

shipbuilding industry at Workington and Maryport, and as some of the craft which is building on speculation of sale has actually been disposed of, new enterprises will follow and the work kept merrily going along. Orders are being sought for which are expected to be obtained, and it is probable that in small tonnage craft the two yards will be as steadily employed during the current year as they have been for a few years past. Indeed, the indications prospect even more than usual activity.

**The Hematite Trade.**—There is still a very full demand for hematite qualities of pig-iron, and the market throughout the month has shown much firmness. Prices have been steady at 48s. to 49s. per ton, and now stand at 48s. 6d. sellers of warrant iron net cash, while makers quote 49s. to 50s. 6d. for mixed Bessemer Nos., net f.o.b. Much of the improvement in the hematite market has been brought about by the extra demand from makers of steel, who are busy in almost all departments. Bessemer iron is especially in demand; indeed, very little of any other quality of iron is enquired for, and latterly a successful attempt has been made to produce that uniformity of quality which enables the best of steel to be made. With this view there is a large importation of the best class of Spanish ore, and cargoes are coming in to west coast ports every week of good 60 per cent. quality. This, which is quoted at 12s. 9d. per ton at local ports, is mixed with native ore at 10s. per ton, the former to the extent of 25 and the latter 75 per cent. of the consumption. Spanish ores are not so silicious as those of the west coast, and they are easy to flux and to smelt. There has been an increase in the number of furnaces in blast. There are now 39 blowing compared with 22 in the corresponding week of last year. Stocks are fairly steady, but they still represent 303,553 tons.

**Shipbuilding Material.**—Makers of steel are especially busy at the plate mills. A brisk demand has been set up for all classes of plates, both for shipbuilding and boiler making, as well as for all classes of shipbuilding material, and the local demand, which is brisk, has been supplemented by a growing enquiry from all other shipbuilding centres. The consequence is that prices are much firmer than they have been, and plates are now quoted very firmly at £5 2s. 6d. per ton. It is quite expected that much higher prices will soon rule, and as makers are already well sold forward they are very chary about accepting new contracts of any size. There is no doubt that this branch of the trade has received an impetus from the big Admiralty programme that has been issued, because it is evident that not only the dock yards but private builders will require very heavy deliveries during the next couple of years at least. This is all the more assured because of the known fact that several big jobs are in embryo for additions to the mercantile marine. The Barrow Steel Co. has received the order for most of the steel required in the construction of H.M.S. *Niobe*, the two torpedo-boat destroyers now building at Barrow, and the new Clan line steamer, as well as for the boilers of the s.s. *Clan Sinclair*, which is to be tripled. Other branches of the steel trade are brisk, and especially so the rail trade, orders for which are largely held and largely offered, prices being at £4 15s. for heavy sections, net f.o.b. This branch of the steel trade is interesting to shipbuilders and others, because of the immense cargoes it finds for shipping. The heavy steel casting industry is very briskly employed, and there is a growing demand for stern posts, stems, and other heavy features in the construction of modern war vessels and the new type of commercial steamers.

**Shipping.**—An improvement is noted in the shipping trade. The exports from West Coast ports this year so far have reached 39,610 tons of pig-iron and 53,415 tons of steel, as compared with 34,318 tons of pig-iron and 39,695 tons of steel in the corresponding week of last year, an increase of 5,292 tons of pig-iron and 13,720 tons of steel.

**Institution of Naval Architects.**—The annual meetings of the institution will take place on March 25th, 26th and 27th, in the hall of the Society of Arts, John Street, Adelphi, W.C. The Right Hon. the Earl of Hopetoun, G.C.M.G., president, will occupy the chair. The annual dinner will be given on Wednesday, March 25th, at the Holborn Restaurant High Holborn, W.C., at 7.15 p.m. The King's Hall has been engaged, which will afford ample accommodation. Tickets will be 7s. 6d. each, exclusive of wine, and will be paid for at the dinner.

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The ship was launched from the  
 Messrs. Palmer's Shipbuilding Co., Limited, a  
 limited liability company, built to the order of  
 Messrs. Thomas & Co., of Liverpool. Her dimensions  
 are—Length between perpendiculars 325 ft.;  
 breadth amidships, 21 ft.;  
 depth from keel to mainmast, 12 ft. 6 in.;  
 draught, 12 ft. 6 in. The ship is  
 fitted with a single screw propeller, and is  
 propelled by a single screw engine, of 1,000  
 horse power, built by Messrs. James & Co.,  
 of Glasgow. The ship is fitted with a  
 single screw propeller, and is propelled by a  
 single screw engine, of 1,000 horse power,  
 built by Messrs. James & Co., of Glasgow.

decks at sides of engine casing. The hull is built on the web-frame principle with cellular double bottom throughout, except in the engine and boiler space, and is fitted with five powerful steam winches and large donkey boiler, patent direct-acting steam windlass and steam warping capstan, her two topmasts being telescopic; large hatchways, double derricks, shifting boards, combined hand and steam steering gear amidships, and screw steering gear aft, and all modern gear for rapid loading and discharging of cargo. The saloon and officers' cabins are aft in a sunk poop and crew accommodation in the 'tween decks forward. The vessel is designed to carry 4,400 tons deadweight cargo on a draught not exceeding 20 ft., and may be regarded as one of the most economical of her class. During construction the vessel has been under the personal supervision of Captain Williams, of Liverpool. As the vessel left the ways she was gracefully christened the *Treasury* by Mrs. William Thomas, wife of the owner. The company afterwards adjourned to the model room, when Mr. J. D. Milburn proposed success to the ship, coupling the toast with the name of Mrs. Thomas. Mr. Thomas responded and congratulated Palmer's Co. on the excellence of the work which was turned out at Jarrow.

**Kingtor.**—On January 31st Messrs. Ropner & Son, Stockton-on-Tees, launched a steel screw steamer of the following dimensions:—Length between perpendiculars, 810 ft.; breadth, extreme, 44 ft.; depth, moulded, 23 ft. The steamer has been built to the order of a London firm, and is built off the two-decked rule, with poop, bridge, and topgallant fore-castle. The saloon and cabins for captain and officers will be fitted up in the saloon house amidships, and the accommodation for engineers will be provided under the bridge deck, the crew being berthed in the fore-castle, as usual. She has a double bottom on the cellular principle, for water ballast, and has been designed to carry a deadweight cargo of over 4,000 tons on Lloyd's summer freeboard; she will have all the most recent deck machinery for the expeditious loading and unloading of cargoes, has direct steam windlass, steam steering gear amidships, with powerful screw gear aft. She will be fitted with a set of powerful triple-expansion engines by Messrs. Blair & Co. The ship was named *Kingtor* by Mrs. R. Ropner, jun.

**Clan Menzies.**—On February 1st the Naval Construction and Armaments Co. launched at Barrow the steamship *Clan Menzies*, built for Messrs. Cayzer, Irvine & Co., owners of the Clan Line of steamers. She is 312 ft. long, 40 ft. moulded breadth, 26 ft. 2 in. depth moulded, and her gross tonnage is 2,600 tons. She is built of steel to Lloyd's highest class, and is arranged as a first-class cargo vessel. The engines are of the triple-expansion type, with cylinders 23 in., 38 in., and 63 in. diameter, and 42 in. stroke. These engines are supplied with steam from two cylindrical multitubular boilers, working at 200 lbs. pressure, forced draught.

**Valhalla.**—On Saturday, February 1st, Messrs. William Gray & Co., Limited, launched the fine steel screw steamer *Valhalla* which they have built to the order of Messrs. Herskind & Co., of West Hartlepool. She is the twenty-fifth vessel which the builders have supplied to the order of Messrs. Herskind & Co., and is one which will maintain the reputation of both builders and owners. Her principal dimensions are:—Length, over all, 310 ft.; breadth, 43 ft., and depth, 19 ft. 11 in., and her class will be the highest at Lloyd's. The type is that of partial awning deck amidships with poop, raised quarter deck and short well and fore-castle, and the rig, fore-and-aft schooner. Very tasteful and comfortable cabin accommodation is provided under the poop, consisting of saloon, state-room, captain's room, officers' berths and large mess-room. The engineers' rooms are amidships and the crew's berths forward. The sides of the vessel are supported by strong web-frames taking the place of hold beams as far as possible, and leaving a clear hold for stowing bulky goods. A cellular double bottom is fitted and also an after peak tank for water ballast, and the steam windlass, steam steering gear amidships, screw gear aft, steam winches, patent donkey boiler and the whole of the outfit are of the most improved description. The engines are by the Central Marine Engine Works of William Gray & Co., Limited, on the triple-expansion system, with cylinders 22 in., 35 in. and 53 in. diameter by 39 in. stroke, and have two fine single-ended boilers 14 ft. diameter by 10 ft. long, to work at 160 lbs. pressure per square inch, fitted with the latest improvements. The ship has been built under the superintendence of Captain Paterseen, and machinery under that of Mr. J. R. Fothergill, on behalf of the company. The ceremony of naming the *Valhalla* was gracefully

fully performed by Miss Herskind, of London, daughter of the owner.

**Lincluden.**—On February 1st Messrs. Furness, Withy & Co., Limited, launched from their shipbuilding works at Hartlepool, a large steel screw steamer, built to the order of Messrs. the Lincluden Steamship Co., Limited, Messrs. Sivewright, Bacon & Co., managers. The vessel is a very substantial type of a modern cargo boat, measuring over 340 ft. in length, and built throughout of Siemens-Martin steel, with a large displacement and deadweight capacity, and built to the highest class under the British Corporation classification. Every care has been taken in designing this ship to construct her as substantial as possible for the heavy deadweight trade. She is built on the deep frame system, with cellular double bottom for water ballast all fore and aft and subdivided at intervals, the after peak being also available as a tank. To further ensure the safety of the vessel, the main and fore holds are divided in the middle by steel watertight bulkheads, these bulkheads being efficiently stiffened by an iron longitudinal division. It is anticipated that with the extra amounts of subdivision in water ballast tanks and holds, and the efficient way the pumping gear was arranged, the vessel will be practically unsinkable by collision or stranding. To obtain as much strength as possible the greater portion of the shell plating is in 24 ft. lengths, this plating being efficiently backed up by strong deep framing carried up to the main deck all fore and aft. The bottom plating is also thicker in way of all ballast tanks to permit the vessel to lie aground whilst taking in cargo. To allow for corrosion the whole of the weather decks, tank tops, floor plates, &c., are of extra thickness, there being practically no thin steel in the ship. She has extra large-sized hatchways, which will take the bulkiest description of cargo, and would be specially suitable for carrying machinery, large guns, torpedo boats, &c. The auxiliary machinery for working and discharging cargo is of the most efficient description, six large winches to latches, patent steam steering gear amidships with hand gear aft, steam windlass, and the anchors being of the stockless pattern. The machinery has been constructed by Messrs. T. Richardson & Son, the engines being of the triple-expansion type, with two large steel boilers. Every provision has been made in designing the machinery for economy of fuel and the minimum cost of upkeep, all the parts being specially heavy, with large bearing surfaces. The extra fittings in the engine-room include Morison's evaporator, and Geddes' water drainers, and the boilers are fitted with suspension furnaces, and Geddes' protector doors. It is anticipated a good speed will be attained by this vessel as she is finer lined than the ordinary run of cargo boats. On leaving the ways the vessel was gracefully christened *Lincluden* by Miss Elsie Bacon, daughter of one of the owners.

**Tropic.**—On Saturday, February 1st, there was launched from the yard of the Tyne Iron Shipbuilding Co., Limited, of Willington Quay-on-Tyne, a steel screw steamer, built to the order of E. C. Thin, Esq., of Liverpool, for whom the builders have previously built several vessels, and of the following dimensions, viz.:—Length, 350 ft.; breadth, 47 ft.; depth, 28 ft. 3 in. moulded, and to class 100 A1 at Lloyd's on the spar deck rule. This vessel has water ballast fitted right fore and aft on the cellular system, and is also fitted with all modern improvements for the rapid loading and discharging of cargo, including good outfit of large double-cylindrical steam winches, direct-acting steam windlass, steam steering gear by Messrs. The Harrison Patent Steering Engine Co., Limited, and Hastie's screw gear aft. The engines, which are to be supplied by Messrs. North-Eastern Marine Engineering Co., Limited, are of the triple-expansion type, having cylinders 25½ in., 41 in. and 68 in. by 48 in. stroke, and working at a pressure of 160 lbs. On leaving the ways the vessel was named the *Tropic* by Miss Bone, of Tynemouth.

**Rosefield.**—On February 1st Messrs. Priestman & Co. launched at Sunderland a cargo vessel for Mr. F. Woods, of London. Her principal dimensions are:—Length, 336 ft.; breadth, extreme, 47 ft.; depth, moulded, 24 ft. 10 in.; and the deadweight capacity will be 4,900 tons on a draught of 20 ft. Engines of the triple-expansion type will be supplied by Messrs. Blair & Co., of Stockton. The cylinders are 24 in., 40 in., and 66 in., by 45 in. stroke. The vessel was named the *Rosefield*.

**Avon.**—On February 1st an iron steam trawler of 143 tons gross, named the *Avon*, was launched at North Shields, owned by Mr. G. Beeching, of Fleetwood.

## LAUNCHES AND TRIAL TRIPS.

## LAUNCHES—ENGLISH.

**Grecian.**—On January 18th an iron steam ketch, of about 118 tons gross, named the *Grecian*, built by Messrs. Cook, Welton & Gemmell, was launched at Hull; owned by Mr. T. Robinson; port of registry, Grimsby.

**Folsjo.**—On January 28th a fine steel screw steamer was launched from the shipbuilding yard of Messrs. Wood, Skinner & Co., at Bill Quay-on-Tyne. The following are the dimensions of the vessel, viz.:—Length over all, 264 ft.; beam, 36 ft.; depth, moulded, 18 ft.; and she is designed to carry 2,300 tons deadweight on a light draught. The vessel has been built to the highest class—1 A1\* Norwegian Veritas—on whose behalf she has been surveyed during construction by the local representative, Mr. Lauritz M. Bodin, of Sunderland. The steamer is of the long raised quarter-deck type, with extended bridge and topgallant forecastle, and will be rigged as a fore-and-aft schooner with fidded topmasts. The saloon, captain's accommodation, and spare berths are arranged in a large house on a bridge deck amidships, and the chart-room on flying bridge above, the officers' accommodation being in side houses at the after end of the bridge deck on either side of the vessel, while the crew are berthed in the forecastle. Water ballast is provided in the cellular double bottom all fore and aft. The vessel will be fitted with every recent improvement and appliance for economical working and for facilitating the rapid loading and discharging of cargo. On leaving the ways the vessel was named the *Folsjo*, by Miss Ida Bodin, of Sunderland. After entering the water in a highly successful manner the vessel was at once towed to the Northumberland Engine Works, at Wallsend, where she will be fitted by the North-Eastern Marine Engineering Co., Limited, with a set of triple-expansion engines, having cylinders 18½ in., 30 in. and 49 in. diameter, by 33 in. stroke, steam being supplied by a large steel boiler having a working pressure of 160 lbs. The vessel has been built to the order of Mr. Alfred Monsen, of Tonsberg, and will be commanded by Captain Bull.

**Huascar.**—On Tuesday, January 28th, there was launched from the yard of the Sunderland Shipbuilding Co., Limited, a steel screw steamer, built to the order of Monsieur Charles Mourraile, of Para, being the pioneer vessel constructed by the above firm for this gentleman, and is specially designed for the Amazon River passenger and trading service under the Peruvian flag. The vessel is of very light draught for trading 3,000 miles up the river, and is very fine, so as to make good headway against the rapid currents. The dimensions of the steamer are as follows:—Length, between perpendiculars, 215 ft.; breadth of beam, 31 ft.; depth, moulded, 15½ ft.; classed 100 A1 at Lloyd's, and English Board of Trade, flush deck grade, with poop, bridge, and forecastle; all weather decks are made of teak, the cabins are arranged specially for hot climates, and have most complete ventilation, and the vessel is well protected by awnings and curtains all fore and aft from the sun. The crew's quarters are in the topgallant forecastle, the engineers and officers' berths and mess-room are under the bridge deck. There is also a large ice-house, and large galley for cooking purposes in this position. The first-class passenger berths are in a large deckhouse on the top of the hurricane deck, with shade deck carried out to ship's side, and each contain spring wire beds, Stone's patent folding lavatories, &c., complete patent w.c.'s and bath-rooms, with tiled floors, &c., are fitted under the bridge. The dining saloon is in another house on the main deck, and is entirely finished in polished mahogany, with pilasters and gilt caps, and panelled in various shades of enamelled paint. The third-class passengers are berthed under the poop in state-rooms, holding six persons each, and fitted with iron beds, &c., complete. The poop and bridge, being joined by a hurricane deck, form a fine promenade deck, and on this deck, at the after end under the awnings, there are to be fitted dining tables and settees, so that meals can be served on deck whilst the vessel is proceeding on her river voyages. The vessel is also fitted up for slinging hammocks for the first-class passengers under all open deck spaces. The vessel is arranged, in addition to the usual way, to steer from the forecastle head, this being particularly adapted for the river navigation. The ship will be lighted throughout by electricity, which work is being done by Messrs. Binko & Co., of London. The steam steering gear is by Messrs. Donkin & Co., of Newcastle, and the steam windlass by Messrs. Emerson, Walker & Thompson

Bros., of Gateshead. The winches, which are of a special design, are by Mr. B. Walford, of Pallion. Tri-compound engines will be supplied by the North-Eastern Marine Engineering Co., Limited, Sunderland, having cylinders 15½ in., 25 in., and 41 in., by 27 in. stroke, with large boiler working at a pressure of 175 lbs., which will give the vessel an average speed of ten knots laden. During construction the vessel and engines have been superintended by Captain Good, on behalf of the owner, and who will take her out to South America, having had a long experience in that trade. Upon leaving the ways she was gracefully named the *Huascar* by Mrs. Good, and was then taken to the South Dock for her machinery and outfit.

**King Edgar.**—On January 29th Messrs. Short Bros. launched at Sunderland a steel screw steamer, built for Messrs. Philipps & Co., of 9, Gracechurch Street, London. The dimensions are: Length, 314 ft.; breadth, 44 ft., and depth, moulded, 28 ft. 2 in. The vessel has been constructed under special survey to the highest class in Lloyd's Register, and was named *King Edgar*. The engines are to be supplied by Messrs. Blair & Co., Limited, of Stockton, and are on the triple-expansion principle, having cylinders 28 in., 37½ in. and 61½ in. diameter, with 39 in. stroke, steam being supplied by two large boilers having a working pressure of 170 lbs. per square inch.

**Fau Sang.**—On January 29th Messrs. Wigham Richardson & Co. launched at Newcastle a screw steamer, which they are constructing for the Indo-China Steam Navigation Co. of London. The vessel is built of steel, and is 290 ft. in length by 40 ft. beam, by 25 ft. in depth, and will be rigged as a two-masted schooner. The engines and boilers are also being constructed by Messrs. Wigham Richardson & Co. The construction of the steamer is proceeding under the superintendence of Mr. Colin Buchanan, the superintendent engineer for the Indo-China Steam Navigation Co., assisted by Mr. Duncan. The vessel was named the *Fau Sang*, the christening ceremony being performed by Mrs. T. Bulmer, of Middlesbrough, the wife of the agent for the Indo-China Co. in the North of England.

**Ekaterinoslavl.**—On January 30th the Russian steel twin-screw passenger and cargo steamer *Ekaterinoslavl* was launched by Messrs. R. & W. Hawthorn, Leslie & Co., Limited, at Hebburn-on-Tyne. The vessel has been built to the order of the Russian Volunteer Fleet, and is 450 ft. by 50 ft. by 32 ft.; and is built to Lloyd's highest class. She is being supplied from the St. Peter's Works with twin-screw triple-expansion machinery, having cylinders 21 in., 34 in. and 55 in. by 42 in.

**Hopper Barges.**—On January 30th Messrs. R. Williamson & Son, of Workington, launched two steel hopper barges for the Town and Harbour Commissioners of Whitehaven. These vessels are 50 ft. by 17 ft. 6 in., by 7 ft. 10½ in. moulded, and are each designed to carry 60 tons.

**Chun Sang.**—On Thursday, January 30th, Sir Raylton Dixon & Co. launched from Cleveland Dockyard, Middlesbrough, a steel spar-deck screw steamer, built to the order of Messrs. The Indo-China Steam Navigation Co., Limited, London. Her principal dimensions are:—Length, 300 ft.; beam, 40 ft.; depth, moulded, 25 ft.; with a deadweight capacity of about 3,800 tons on 20 ft. The vessel has been built on the deep-frame system under Lloyd's special survey for their highest class, and specially designed for trading in the Eastern seas. The spar deck is of steel sheathed with teak, and the bridge and forecastle decks of teak. The 'tween decks also are arranged for carrying Chinese passengers. Triple-expansion engines 21 in., 34 in., 56 in., by 42 in. stroke, will be fitted by Messrs. The North-Eastern Marine Engineering Co., Limited, Sunderland, having boiler fitted with Howden's forced draught. The hull and machinery have been built under the supervision of Mr. Buchanan and Mr. Duncan. On leaving the ways she was gracefully named *Chun Sang* by Mrs. Alfred William Bulmer, of Great Ayton.

**Treasury.**—On January 30th there was launched from the Jarrow Yard of Messrs. Palmer's Shipbuilding Co., Limited, a very fine modelled steel screw steamer, built to the order of Messrs. William Thomas & Co., of Liverpool. Her dimensions are as follows:—Length, between perpendiculars, 325 ft.; beam, 43 ft.; depth, moulded, 21 ft. 6 in.; and she is built to Lloyd's highest class under special survey. She has partial awning deck extending from the stem to the mainmast, accommodation for the engineers being provided in the 'tween

decks at sides of engine casing. The hull is built on the web-frame principle with cellular double bottom throughout, except in the engine and boiler space, and is fitted with five powerful steam winches and large donkey boiler, patent direct-acting steam windlass and steam warping capstan, her two topmasts being telescopic; large hatchways, double derricks, shifting boards, combined hand and steam steering gear amidships, and screw steering gear aft, and all modern gear for rapid loading and discharging of cargo. The saloon and officers' cabins are aft in a sunk poop and crew accommodation in the 'tween decks forward. The vessel is designed to carry 4,400 tons deadweight cargo on a draught not exceeding 20 ft., and may be regarded as one of the most economical of her class. During construction the vessel has been under the personal supervision of Captain Williams, of Liverpool. As the vessel left the ways she was gracefully christened the *Treasury* by Mrs. William Thomas, wife of the owner. The company afterwards adjourned to the model room, when Mr. J. D. Milburn proposed success to the ship, coupling the toast with the name of Mrs. Thomas. Mr. Thomas responded and congratulated Palmer's Co. on the excellence of the work which was turned out at Jarrow.

**Kingtor.**—On January 31st Messrs. Ropner & Son, Stockton-on-Tees, launched a steel screw steamer of the following dimensions:—Length between perpendiculars, 310 ft.; breadth, extreme, 44 ft.; depth, moulded, 23 ft. The steamer has been built to the order of a London firm, and is built off the two-decked rule, with poop, bridge, and topgallant forecabin. The saloon and cabins for captain and officers will be fitted up in the saloon house amidships, and the accommodation for engineers will be provided under the bridge deck, the crew being berthed in the forecabin, as usual. She has a double bottom on the cellular principle, for water ballast, and has been designed to carry a deadweight cargo of over 4,000 tons on Lloyd's summer freeboard; she will have all the most recent deck machinery for the expeditious loading and unloading of cargoes, has direct steam windlass, steam steering gear amidships, with powerful screw gear aft. She will be fitted with a set of powerful triple-expansion engines by Messrs. Blair & Co. The ship was named *Kingtor* by Mrs. R. Ropner, jun.

**Clan Menzies.**—On February 1st the Naval Construction and Armaments Co. launched at Barrow the steamship *Clan Menzies*, built for Messrs. Cayzer, Irvine & Co., owners of the Clan Line of steamers. She is 312 ft. long, 40 ft. moulded breadth, 26 ft. 2 in. depth moulded, and her gross tonnage is 2,600 tons. She is built of steel to Lloyd's highest class, and is arranged as a first-class cargo vessel. The engines are of the triple-expansion type, with cylinders 23 in., 38 in., and 63 in. diameter, and 42 in. stroke. These engines are supplied with steam from two cylindrical multitubular boilers, working at 200 lbs. pressure, forced draught.

**Valhalla.**—On Saturday, February 1st, Messrs. William Gray & Co., Limited, launched the fine steel screw steamer *Valhalla* which they have built to the order of Messrs. Herskind & Co., of West Hartlepool. She is the twenty-fifth vessel which the builders have supplied to the order of Messrs. Herskind & Co., and is one which will maintain the reputation of both builders and owners. Her principal dimensions are:—Length, over all, 310 ft.; breadth, 43 ft., and depth, 19 ft. 11 in., and her class will be the highest at Lloyd's. The type is that of partial awning deck amidships with poop, raised quarter deck and short well and forecabin, and the rig, fore-and-aft schooner. Very tasteful and comfortable cabin accommodation is provided under the poop, consisting of saloon, state-room, captain's room, officers' berths and large mess-room. The engineers' rooms are amidships and the crew's berths forward. The sides of the vessel are supported by strong web-frames taking the place of hold beams as far as possible, and leaving a clear hold for stowing bulky goods. A cellular double bottom is fitted and also an after peak tank for water ballast, and the steam windlass, steam steering gear amidships, screw gear aft, steam winches, patent donkey boiler and the whole of the outfit are of the most improved description. The engines are by the Central Marine Engine Works of William Gray & Co., Limited, on the triple-expansion system, with cylinders 22 in., 35 in. and 53 in. diameter by 39 in. stroke, and have two fine single-ended boilers 14 ft. diameter by 10 ft. long, to work at 160 lbs. pressure per square inch, fitted with the latest improvements. The ship has been built under the superintendence of Captain Paterson, and the machinery under that of Mr. J. R. Fothergill, on behalf of the owners. The ceremony of naming the *Valhalla* was grace-

fully performed by Miss Herskind, of London, daughter of the owner.

**Lincluden.**—On February 1st Messrs. Furness, Withy & Co., Limited, launched from their shipbuilding works at Hartlepool, a large steel screw steamer, built to the order of Messrs. the Lincluden Steamship Co., Limited, Messrs. Sivewright, Bacon & Co., managers. The vessel is a very substantial type of a modern cargo boat, measuring over 340 ft. in length, and built throughout of Siemens-Martin steel, with a large displacement and deadweight capacity, and built to the highest class under the British Corporation classification. Every care has been taken in designing this ship to construct her as substantial as possible for the heavy deadweight trade. She is built on the deep frame system, with cellular double bottom for water ballast all fore and aft and subdivided at intervals, the after peak being also available as a tank. To further ensure the safety of the vessel, the main and fore holds are divided in the middle by steel watertight bulkheads, these bulkheads being efficiently stiffened by an iron longitudinal division. It is anticipated that with the extra amounts of subdivision in water ballast tanks and holds, and the efficient way the pumping gear was arranged, the vessel will be practically unsinkable by collision or stranding. To obtain as much strength as possible the greater portion of the shell plating is in 24 ft. lengths, this plating being efficiently backed up by strong deck framing carried up to the main deck all fore and aft. The bottom plating is also thicker in way of all ballast tanks to permit the vessel to lie aground whilst taking in cargo. To allow for corrosion the whole of the weather decks, tank tops, floor plates, &c., are of extra thickness, there being practically no thin steel in the ship. She has extra large-sized hatchways, which will take the bulkiest description of cargo, and would be specially suitable for carrying machinery, large guns, torpedo boats, &c. The auxiliary machinery for working and discharging cargo is of the most efficient description, six large winches to latches, patent steam steering gear amidships with hand gear aft, steam windlass, and the anchors being of the stockless pattern. The machinery has been constructed by Messrs. T. Richardson & Son, the engines being of the triple-expansion type, with two large steel boilers. Every provision has been made in designing the machinery for economy of fuel and the minimum cost of upkeep, all the parts being specially heavy, with large bearing surfaces. The extra fittings in the engine-room include Morison's evaporator, and Geddes' water drainers, and the boilers are fitted with suspension furnaces, and Geddes' protector doors. It is anticipated a good speed will be attained by this vessel as she is finer lined than the ordinary run of cargo boats. On leaving the ways the vessel was gracefully christened *Lincluden* by Miss Elsie Bacon, daughter of one of the owners.

**Tropic.**—On Saturday, February 1st, there was launched from the yard of the Tyne Iron Shipbuilding Co., Limited, of Willington Quay-on-Tyne, a steel screw steamer, built to the order of E. C. Thin, Esq., of Liverpool, for whom the builders have previously built several vessels, and of the following dimensions, viz.:—Length, 350 ft.; breadth, 47 ft.; depth, 28 ft. 3 in. moulded, and to class 100 A1 at Lloyd's on the spar deck rule. This vessel has water ballast fitted right fore and aft on the cellular system, and is also fitted with all modern improvements for the rapid loading and discharging of cargo, including good outfit of large double-cylindrical steam winches, direct-acting steam windlass, steam steering gear by Messrs. The Harrison Patent Steering Engine Co., Limited, and Hastie's screw gear aft. The engines, which are to be supplied by Messrs. North-Eastern Marine Engineering Co., Limited, are of the triple-expansion type, having cylinders 25½ in., 41 in. and 68 in. by 48 in. stroke, and working at a pressure of 160 lbs. On leaving the ways the vessel was named the *Tropic* by Miss Bone, of Tynemouth.

**Rosefield.**—On February 1st Messrs. Priestman & Co. launched at Sunderland a cargo vessel for Mr. F. Woods, of London. Her principal dimensions are:—Length, 336 ft.; breadth, extreme, 47 ft.; depth, moulded, 24 ft. 10 in.; and the deadweight capacity will be 4,900 tons on a draught of 20 ft. Engines of the triple-expansion type will be supplied by Messrs. Blair & Co., of Stockton. The cylinders are 24 in., 40 in., and 66 in., by 45 in. stroke. The vessel was named the *Rosefield*.

**Avon.**—On February 1st an iron steam trawler of 143 tons gross, named the *Avon*, was launched at North Shields, owned by Mr. G. Beeching, of Fleetwood.



**Ajax.**—Messrs. Cochrane & Cooper have lately launched from their yard at Grovehill, a new steam trawler, which has been built to the order of Mr. William Grant, of Grimsby. The vessel is of the following dimensions:—89 ft. by 20 ft. by 10 ft. 8 in. She will be fitted with 40 N.H.P. triple-expansion engines, by Messrs. C. D. Holmes & Co., of Hull. As the vessel left the ways she was christened the *Ajax* by Miss Annie E. Robinson. After the launch the company proceeded to the 'Beverly Arms, where lunch was partaken of and the usual toasts were proposed and duly responded to.

**T. W. Stuart.**—On February 10th, Messrs. Wood, Skinner & Co. launched at Bill Quay-on-Tyne, a steel screw steamer which has been built to the order of Messrs. T. Thompson & Son, Quayside, Newcastle-on-Tyne. The vessel is intended for the coasting trade. The principal dimensions of the ship are:—Length, 123 ft. between perpendiculars; beam, 21 ft. 3 in.; depth, moulded, 10 ft. She was named *T. W. Stuart* by Mrs. Thompson, wife of the senior managing owner. The vessel was towed round to the North-Eastern Marine Engineering Co.'s, Limited, Works, at Sunderland, where she will be fitted with compound engines, having cylinders 16 in. and 32 in. diameter respectively, with a stroke of 22 in.

**Queen Cristina.**—On February 15th Messrs. Bartram & Sons launched from their shipbuilding yard at Sunderland a large and beautifully-modelled steel screw steamer for Messrs. Thomas Dunlop & Sons, Glasgow. The vessel is of the spar-deck type, with a long bridge and topgallant forecastle, and is of the following dimensions:—Length, 344 ft.; breadth, 45 ft.; depth, 28 ft. 9 in., and will carry a large cargo on a moderate draught of water. She has been built to the highest class in Lloyd's Registry, and under the supervision of Captain A. H. Jack on behalf of the owners. There are six steel bulkheads, and the double bottom, which is on the cellular principle, will contain an extra large quantity of water ballast. There are no hold beams, and the holds are practically clear of obstructions, and suitable for general cargoes. The decks are of extra thickness to guard against corrosion, and the vessel is in many respects well in excess of Lloyd's requirements. The deck machinery consists of five large steam winches made by Messrs. Clarke, Chapman & Co.; a direct-acting steam windlass, one of Riley Brothers' multitubular donkey boilers, and Messrs. Caldwell & Co.'s steam-steering gear, which is placed at the after end of the engine-room, and controlled by the helmsman on the bridge. The engines will be supplied by Messrs. John Dickinson & Sons, Limited, the cylinders being 24½ in., 40 in., 60 in., by 45 in. stroke. The boilers are of extra size, and will be fitted with Howden's system of forced draught, the working steam pressure being 160 lbs. In addition to the usual machinery, the engines will be fitted with steam turning engine, steam ash hoist, Owen's patent pump, Morison's evaporator, Weir's filter, and Kirkaldy's feed-heater. During construction the engines have been superintended by Mr. Christie, of Glasgow, on behalf of the owners. As the vessel left the stocks she was gracefully christened *Queen Cristina* by Miss Buchanan, of London.

**Kylemoor.**—On February 12th Messrs. John Readhead & Sons launched at South Shields a steel screw steamer, built to the order of Messrs. Walter Runciman & Co., Newcastle-on-Tyne. This steamer, which has been built to class 100 A1 at Lloyd's, is of the following dimensions:—323 ft. in length, 46 ft. broad, and 25 ft. 6 in. deep, and is on the improved single-deck principle, with poop aft, containing cabin accommodation, long bridge amidships for officers' accommodation, and topgallant forecastle for crew. The steamer is fitted with steam winch, windlass, steam steering gear, shifting boards for grain cargoes, and all the latest improvements for rapid loading and discharging. The deadweight capacity is over 5,100 tons on a light draught. The engines, also built by Messrs. Readhead & Sons, are of triple-expansion type, and have cylinders of 24 in., 40 in. and 64 in., by 42 in. stroke. Steam will be supplied by two large steel boilers, working at a pressure of 160 lbs. per square inch. As the vessel left the ways she was named the *Kylemoor* by Miss Elsie Readhead, daughter of Mr. James Readhead. This is the eighth vessel built by Messrs. Readhead for Messrs. Runciman & Co.

**Dacia.**—On Wednesday afternoon, February 12th, Messrs. Richardson, Duck & Co. launched from their yard a steel-screw steamer of the following dimensions, viz.:—Length, over all, 299 ft.; breadth, extreme, 42 ft.; depth, moulded, 22 ft.; tonnage, gross, 2,160 tons. This steamer, which has been

built to the order of Messrs. A. C. de Freitas & Co., of Hamburg, will class 100 A1 in Lloyd's Register, and has been built under special survey. She is of the single deck type with poop for captain and officers. Bridge over engines and boilers, with engineers berthed in after end and topgallant forecastle for crew. A cellular double bottom throughout and after peak tank are fitted for water ballast, and the equipment includes four steam winches, large donkey boiler, steam-windlass, stockless anchors, steam steering gear, &c. The engines, by Messrs. Blair & Co., have cylinders 22 in., 36 in., and 59 in. by 39 in., steam being supplied by two single-ended boilers, having a working pressure of 160 lbs. As the vessel left the ways she was christened *Dacia*, by Miss Gillett, of Warminster, Wilts.

**Leitrim.**—On Friday, February 14th, there was successfully launched from the East Yard of Messrs. C. S. Swan & Hunter, Limited, a fine steel screw steamer, 380 ft. long by 48 ft. 6 in. extreme, by 30 ft. 4 in. moulded depth, built on the spar deck grade to Lloyd's highest class; long bridge house amidships, topgallant forecastle, cellular double bottom throughout. The vessel will be fitted with all the most modern appliances for the rapid loading and discharging of cargo, including iron crane posts and a large number of steam winches. The fore and after cargo holds will also be insulated for carrying frozen dead-meat. As the vessel left the ways, she was named *Leitrim*, by Mrs. R. M. Hudson, junr., Sunderland.

**Selma.**—On February 15th this vessel, a turret-deck steamer, was launched from the yard of Messrs. William Doxford & Sons, Limited, of Sunderland, having been built to the order of Messrs. George Horsley & Son, Hartlepool. She will receive the highest class in both the Bureau Veritas and British Corporation registries. Her deadweight capacity is somewhat over 5,600 tons. She has exceptionally large measurement capacity, and is built on the single deck principle. The christening ceremony was performed by Miss Atley.

**Kelvin.**—On Saturday, February 15th, Messrs. Short Bros., Pallion, launched from their shipbuilding yard a handsomely-modelled steel screw steamer, built to the order of the Glasgow Steam Shipping Co., of which Messrs. John Black & Co., of Glasgow, are the managers, of the following dimensions:—Length, 316 ft.; breadth, 42 ft.; and depth, moulded, 26 ft. 9 in., and capable of carrying a large cargo on a comparatively shallow draught. The vessel has been built of steel under special survey to the highest class in Lloyd's Registry for the improved spar-deck grade, having only one deck laid with deep framing in lieu of web frames or beams in lower hold, and is constructed on the cellular double-bottom principle, divided into compartments for trimming. The holds are four in number, with a large hatchway to each, with six powerful steam winches for the rapid discharging of cargoes, steam for which is supplied by a large multitubular donkey boiler placed in stokehold. The vessel is also fitted with short cargo poop, long bridge amidships, extending over engines and boiler spaces, on top of which, in houses, is fitted accommodation for captain, officers, engineers, &c., the saloon being handsomely fitted up in polished hardwood, on top of which is fitted the chart-room and flying bridge. The steam steering gear is fitted abaft of engine platform, and controlling rods and gear to flying bridge. The crew are berthed in a commodious topgallant forecastle. On leaving the ways the vessel was named *Kelvin*, the ceremony being gracefully performed by Mrs. W. A. Arrol, of Glasgow. The steamer is fitted with engines and boilers having a working pressure of 180 lbs., and fitted with Howden's forced draught by Messrs. W. Allan & Co., Limited, of Sunderland, with all the latest improvements in marine engineering. The vessel and engines during construction have been superintended by Mr. George M'Farlane, of 121, West George Street, Glasgow, on behalf of the owners.

**Phoenix.**—On February 15th there was launched by Messrs. Edwards Brothers, at North Shields, the steam screw fishing steamer *Phoenix*, whose dimensions are 90 ft. by 20 ft. by 11 ft. 7½ in. moulded, built to the order of Messrs. John Mackrill & Sons, Grimsby, for their fleet of trawlers. The engines are being constructed by the North-Eastern Marine Engineering Co., Limited, Sunderland.

**Capitan Orella.**—On February 15th Messrs. Laird Brothers launched at Birkenhead the *Capitan Orella*, the first of four 80-knot torpedo-boat destroyers they are constructing for the Chilean Government. She is similar to the boats of the same class which they are building for her Majesty's Government.

**Lorle.**—On February 15th Messrs. Irvine & Co., West Hartlepool, launched a fine steel screw steamer of about 4,100 tons deadweight carrying capacity, built to the order of Messrs. Trechmann Brothers, West Hartlepool. The vessel will take Lloyd's highest class, and has been built under special survey. Her dimensions are 314 ft. by 44 ft. by 23 ft. 3 in. The deck erections consist of poop, bridge, and topgallant-forecastle. The saloon and cabins for captain and officers' are fitted up in poop. The engineers are berthed under bridge deck at sides of engine-room, and the crew in topgallant-forecastle. The hull is built on the web-frame principle, with double bottom for water ballast fore and aft. Large hatchways are fitted four steam winches by Irvine & Co., steam steering gear amidships, screw gear aft, two large donkey boilers, and direct steam windlass. The boats are placed on beams overhead, and all modern appliances will be fitted for general trading. Engines of the triple-expansion type are being supplied by Messrs. Blair & Co., Limited, Stockton-on-Tees. The hull and machinery have been built under the supervision of Messrs. John Trechmann and J. Maddison. The christening ceremony was gracefully performed by Miss Queenie Trechmann, who named the vessel *Lorle*.

**Dido.**—On February 17th Earle's Shipbuilding Co. launched at Hull a large steamer built to the order of Messrs. Thomas Wilson, Sons & Co., Limited, of Hull, for their Bombay trade. She was named the *Dido*. The steamer will, it is stated, have a larger carrying capacity than any other vessel sailing out of Hull. Her dimensions are:—Length, 400 ft.; breadth, 48 ft.; depth, moulded, 32 ft. She is built of steel to the highest class in the British Corporation Registry, and on the cellular system of framing. The total deadweight to be carried will be about 7,200 tons, and the ship is expected to steam 10 knots. She will be fitted with triple-compound engines, steam for which at 200 lbs. pressure will be supplied from three large steel boilers arranged to work with Ellis-Eaves system of induced draft.

**Minneburg.**—On Tuesday, February 18th, there was launched from the Cleveland Dockyard of Sir Raylton Dixon & Co., Middlesbrough, a fine steel screw steamer which has been built to the order of the Hansa Steamship Co., of Bremen, under the supervision of Mr. D. Wulff, their superintendent engineer. Her principal dimensions are:—Length, 323 ft.; beam, extreme, 42 ft. 6 in.; depth, moulded, 25 ft., with a deadweight capacity of about 3,600 tons. She is of the spar-deck type and has been built under special survey for Lloyd's highest class. The poop-bridge and forecastle decks are of teak. The captain, officers and engineers are accommodated in houses on bridge-deck, and the crew in the topgallant-forecastle. Quadruple expansion engines, built to German law requirements, will be supplied by Messrs. Wigham Richardson & Co., Newcastle-on-Tyne, having cylinders 19½ in., 28 in., 42 in., and 61 in. by 42 in. stroke, with two large boilers working at 215 lbs. pressure. On leaving the ways the vessel was named *Minneburg*.

#### LAUNCHES—SCOTCH.

**Haller.**—On January 27th there was launched by Messrs. J. Duthie, Sons & Co., at Aberdeen, a steel screw steamer, of 500 tons deadweight capacity, which is being fitted with triple-expansion engines by Messrs. Hall, Russell & Co., also of Aberdeen. The vessel was named the *Haller*. She will be registered at the port of Hull by Mr. G. Haller, the owner, and will form one of his Haller Line of steamers running twice weekly between Hull and London.

**Steel Screw Hopper Steamer.**—On January 29th Messrs. Fleming & Ferguson, Limited, shipbuilders and engineers, Paisley, launched from their yard a steel screw hopper steamer which they have constructed to the order of the Admiralty. The dimensions of the vessel are:—155 ft. by 31 ft. by 12 ft. 6 in., and she has a carrying capacity of 600 tons. The engines and machinery will be supplied by the builders. The vessel is one of three similar steamers being constructed by this firm to the order of the Admiralty for Portsmouth Dockyard.

**Magnus.**—On January 31st Messrs. Hawthorns & Co., Leith, launched from their yard the vessel *Magnus*, a steel screw trawler for the Liverpool Steam Fishing Co. The vessel is 105 ft. long, 20 ft. 6 in. broad, and 11 ft. 3 in. deep. She will be fitted by the makers with triple-expansion engines, with cylinders of 11 in., 17½ in., and 30 in. diameter by 21 in. stroke, and

boilers working up to a pressure of 160 lbs. The vessel will also have all the latest working gear, as well as an installation of the electric light, a new feature in regard to trawlers. The *Magnus* is classed 100 A1 at Lloyd's. Messrs. Hawthorns have at present on hand two orders for an Anstruther steam fishing company.

**Perseverance.**—On February 4th there was launched from the shipbuilding yard of Messrs. Archd. McMillan & Son, Limited, Dumbarton, a steel sailing ship of about 1,920 tons register, for Glasgow owners. As the vessel left the ways she was named the *Perseverance*.

**Princess.**—On February 10th Messrs. Russell & Co., Port-Glasgow, launched a stern-wheel steamer for the African Lakes Co. The steamer, which on leaving the ways was named *Princess*, will be engaged by Messrs. Kincaid & Co., Greenock. After completing her trials the vessel will be taken to pieces and shipped to her destination, to be employed in passenger service on the African lakes.

**Hillbrook.**—On February 15th Messrs. William Hamilton & Co. launched from their Glen Yard a steel screw steamer to carry 4,800 tons deadweight, for Messrs. Hugh Evans & Co., Liverpool, for their Eastern and general trade. The following are the principal dimensions:—Length, 310 ft.; breadth, 42 ft. 6 in.; depth, moulded to main deck, 21 ft. 9 in. The vessel has been built to the highest class at Lloyd's, 160 A1, partial awning deck on the deep frame system, and is fitted throughout with a double cellular bottom for water ballast. All the newest requirements for the quick loading and discharging and the working of the ship have been supplied, including steam windlass, steam steering gear, steam winches, &c. The holds are fitted with shifting boards and feeders in the 'tween decks for carrying grain in bulk. The vessel is fore-and-aft schooner rigged, and the topmasts are made to telescope, so that she can pass under the bridges on the Manchester Canal. The accommodation for the officers and crew is of the most complete description—the captain and officers being in a large bridge house amidships on the awning deck, the engineers being placed in houses alongside engine casing, convenient for their work, whilst the crew are placed under awning deck forward. The machinery, which is being supplied by Messrs. D. Rowan & Son, of Glasgow, is on the triple-expansion system. The cylinders are 22½ in., 37 in., and 61 in. diameter, by 42 in. stroke, the two boilers working at a pressure of 160 lbs. As the vessel left the ways she was gracefully named *Hillbrook* by Mrs. Austin Taylor, of Liverpool, wife of the owner. Immediately after the launch the vessel was towed to Glasgow to receive her machinery, and she is expected to go on trial by the first week in March. The steamer has been built under the supervision of Mr. Thomas, the company's inspector, who, along with Captain Homewood, who is to be in command, was present at the launch.

**Nephrite.**—On Saturday afternoon, February 15th, Messrs. Scott & Sons launched from their shipbuilding yard at Bowling a screw steamer of dimensions 185 ft. by 29 ft. by 18 ft.; built to the order of Mr. William Robertson, 15, Gordon Street, Glasgow. Triple-expansion engines will be fitted on board by Messrs. Muir & Houston, Limited, Kinning Park, Glasgow. On moving down the ways the steamer was named *Nephrite* by Miss Kate M'N. Brown, Meadow Flat, Renfrew.

**Glenlochy.**—On February 15th the London and Glasgow Engineering and Iron Shipbuilding Co., Limited, launched from their yard at Govan, the first of two large steel screw steamers building to the order of Messrs. M'Gregor, Gow & Co., London, for their Glen Line of steamers. The vessel's dimensions are 400 ft. by 49 ft. by 31 ft. moulded, with a gross tonnage of about 4,850 tons, and she will have a deadweight carrying capacity of 7,000 tons, cargo capacity of about 8,750 tons, and water ballast tanks in double bottom for about 840 tons. The main and upper decks are of steel, and the upper deck and bridge decks are covered with yellow pine. The forecastle deck is teak. The vessel has seven watertight bulkheads extending to the upper deck, having a watertight door between decks in each to facilitate the transfer of cargo. To load or discharge cargo speedily the derricks are stepped on specially-constructed columns so placed that cargo may be brought from both sides of the ship simultaneously. There are 10 large steam winches, supplied by Messrs. Clarke, Chapman & Co., as are also the windlass and capstan forward. Messrs. Caldwell & Co.'s steam steering gear is fitted in the aft end of the engine casing, and in

communication with the engine-room, having a direct lead to the large circular tiller in the wheel-house aft, where a powerful screw gear is also fitted up for steering the ship by hand if required. The captain's, officers', and state rooms, also the dining saloon, are situated on the bridge deck at the fore end of engine and boiler space, each officer having a large and airy apartment heated by steam and lit by electric light. The engineers have the same style of accommodation as the officers, their rooms being built round the engine casing. Great attention has been paid to the crew's accommodation, which is under the long forecabin; their sleeping-rooms, besides being well lit and ventilated, have a large circular steel skylight fitted through each side of the forecabin deck. In these ships a special feature has been introduced in providing a mess-room for the crew. The vessel is to be lit throughout by electric light, the installation being by Messrs. Clarke, Chapman & Co. The propelling machinery (supplied by the builders) consists of one set of triple-expansion engines. The cylinders are 29 in., 47 in., and 77 in. diameter, with a stroke of 54 in., and capable of working up to 8,500 H.P. Steam is supplied by three angled-ended boilers, constructed for a working pressure of 170 lbs. per square inch, and fitted to work with Howden's system of forced draught. The machinery department is supplied with all the most modern appliances for economical working, including Weir's heater and pumps, Rayner's evaporator, &c. There is also a powerful auxiliary boiler capable of supplying steam for driving the ten cargo winches. As the vessel left the ways she was named the *Glenlocky*, by Miss Lizzie Reid, of Kilmardinny.

**Mataura.**—On February 15th, Messrs. Barclay, Curle & Co., Limited, launched from their shipyard, Whiteinch, Glasgow, a handsome steel screw-steamer, built to the order of the New Zealand Shipping Co., Limited, of London, and intended for the carriage of frozen meat and general cargo between the United Kingdom and New Zealand. The vessel is schooner-rigged, and constructed on Lloyd's three-deck rule, to the highest class in their register. Her deck erections are—Poop, long bridge and topgallant forecabin, and on the bridge a large handsome saloon has been fitted for the accommodation of passengers. The vessel is fitted throughout with electric light by Sharpe & Kent, of London and Glasgow. The fore part of the vessel is completely insulated, the insulation extending from the boiler-room bulkhead to the fore peak. The refrigerating machinery has been supplied by the Linde British Refrigeration Co., Limited, of London, and is on their well-known ammonia system, and the ventilation of holds has received special and careful attention. The appliances for working both ship and cargo are up to date, and include steam windlass, 10 steam winches, Wotherpoon's patent steering gear aft and bow, and M'Leachlan & Co.'s gear amidships. She is also supplied with Wotherpoon's steel accommodation ladders, and her lifeboats are of seamless steel. While under construction the vessel and machinery were under the superintendence of Mr. Wotherpoon, assisted by Mr. Weir. Her dimensions are—481 ft. by 54½ ft. by 32 ft., and she will carry about 8,400 tons. On leaving the ways she was named the *Mataura* by Mrs. Leigh King, the wife of the assistant manager of the New Zealand Steamship Co., Limited. Her engines are on the triple-expansion principle, with Howden's forced draught, and are being constructed by the builders.

**London City.**—On February 17th an important launch took place on the Clyde from the shipbuilding and engineering establishment of Messrs. Alexander Stephen & Sons, of Glasgow, which created considerable interest in shipping circles. The vessel is the largest that has been launched from the famous Linthouse yard, and is built to the order of Sir Christopher Furness, of West Hartlepool and London, expressly for the service of the well-known "Furness" Line, as a fast cargo and cattle steamer. The general dimensions are—465 ft. long by 49 ft. beam by 34 ft. 3 in., measured to upper deck, and she has a measurement carrying capacity of about 10,000 tons, in addition to having a shelter deck extending the full length of the ship from stem to stern, under which approved cattle fittings are erected for about 700 head, whilst the upper bridge deck erection amidships is arranged for the accommodation of captain, officers and engineers, whose apartments are large and well ventilated. There is also space in this bridge for over 100 head of cattle or horses, of which the "Furness" Line carry so large a number. She has two complete steel decks and steel lower deck, extending from forward machinery bulkhead to stern, and extra

parting arrangements forward and aft, and is built to Lloyd's 100 A1 class, three deck rule. The great speciality of this vessel is her exceptionally well designed cattle-carrying arrangements. The entire run under the shelter deck all fore and aft, and the spaces under bridge deck being fitted with Wylie's patent slingable fittings. The upper deck is covered with cement; the hatchways and coamings are also designed specially to increase the cattle-carrying accommodation, without interfering with cargo facilities. The perfect system of fresh water circulation is also worthy of note, this being arranged under gravitation pressure through all the spaces allotted to cattle, which supplies the wants of the animals most amply with the least possible trouble to the cattlemen and attendants. The cattlemen are located in the forward part of the ship in well-arranged and airy apartments. There are a hundred and one other details in the construction and design which in total make the vessel the most perfect cattle-carrying steamer that knowledge and experience can devise. In giving special attention to the cattle arrangements, the speedy loading and discharging of cargo has by no means suffered, the vessel having seven hatchways, and eight steam winches, supplied by an unusually large donkey boiler, each winch being fitted with four whipping drums working on to the gins, and other recent improvements. The steamer has combined hand and screw steam steering gear fitted in house aft under shelter deck, with patent spring steering quadrant and patent rudder brake. She is fitted with Clarke, Chapman's patent windlass with extended ends for warping purposes, and steam capstan is also fitted aft for a similar purpose. To further expedite the handling of cargo, and the comfort of the crew and cattlemen on board, the vessel has been lighted throughout with a perfect system of electric light, on the return wire system, by W. C. Martin & Co., of Glasgow. Moreover, the whole of the living accommodation is heated by steam, which will add greatly to the comfort of all on board, especially for the Atlantic winter service. The vessel is rigged with four pole masts, and will be provided with extra facilities for dealing expeditiously with grain cargoes. The machinery, which is constructed by the builders, Messrs. Alexander Stephen & Sons, consists of a set of inverted direct-acting triple-expansion engines, having cylinders 32 in., 54 in., and 86 in. diameter, by 54 in. stroke; supplied with steam by three double-ended boilers, having large heating and grate surfaces, and working at a pressure of 180 lbs. per square inch. The engines are designed to give the vessel a speed of about 13 knots at sea, and are fitted with all the most modern appliances for saving of labour and economising of fuel, such as Morison's patent feed-heater and evaporator, Carruther's automatic feed pumps and float tank, large ballast pumps; cattle pumps for fresh water; Drysdale's centrifugal circulating pumps and engines, steam turning and reversing engines, &c., &c., and to still further increase the speed, she has been furnished with four bronze propeller blades. The vessel has been built much in excess of Lloyd's requirements, and is fitted with water ballast on the cellular double-bottom principle, extending fore and aft. An after peak tank is also arranged for water ballast. Taking the above mentioned specialities into consideration and the steamer as a whole, she appears to be well worthy of the important position that has been assigned to her on the "Furness" Line, which has become so popular, not only for its regular service of steamers in general, but for the safe carrying of cattle—which latter may be materially extended when this latest addition to their already large fleet takes her allotted position on the line. As the vessel left the ways she was christened the *London City* by Mrs. W. Wingate Gray, of Nunraw, Haddingtonshire. The builders have in an advanced state an exact duplicate of the *London City* for the same owner, which is to be named the *Chicago City*, also to be run on the "Furness" Line between the United States and London.

**Palena.**—On February 17th the *Palena* was launched by Messrs. John Reid & Co., Limited, Whiteinch, and is the twelfth vessel built by them for her owners, the Compania Sud Americana de Vapores, Valparaiso, who are represented in this country by Thomas Dewsbury, Esq., Leeds. The *Palena* is almost a duplicate of the *Loa*, completed a year ago by the same builders, and embraces every improvement in design and equipment to adapt her for the mail, passenger, and general cargo service carried on by the company on the western coast of South America. The vessel, which measures about 365 ft. in length, is built of steel to Lloyd's highest class, and is fitted with cellular water ballast bottom throughout. The two upper

decks are of teak, and these are entirely taken up with accommodation for passengers, the upper or shade deck being used for an extensive dining saloon, social hall, and captain's room, while the promenade deck below this is occupied with state-rooms for passengers and officers, mail room, specie room and other requirements of a first-class passenger steamer. The decorations, paintings, and glass staining, as well as all the fittings and equipment, are executed in the most tasteful, complete and luxurious manner, indicating throughout the best results of experience in meeting the various exigencies of the company's service. The main deck is fitted almost entirely with cattle stalls, while the lower deck and holds are adapted for carrying cargo. In addition to the usual outfit of oil-lamps the vessel has been fitted throughout with a complete installation of electric lights, having two engines and two dynamos to work separately or together. The machinery, which is being fitted by Messrs. Dunsmuir & Jackson, of Govan, consists of triple-expansion engines, having cylinders 28 in., 45 in., and 74 in. diameter by 54 in. stroke. Mr. Dewsbury has been assisted in the supervision of the construction of the *Palena* by Mr. J. A. Wyllie, and the vessel will be commanded by Captain Moon, who has long been in the company's service. On leaving the ways the *Palena* received her name from Mrs. Eddison, of Leeds, daughter of Mr. Dewsbury. This vessel was ready for launching three months ago but has been delayed till now in consequence of the engineers' strike.

**Okinawa Maru.**—On February 18th Messrs. Lobnitz & Co., Renfrew, launched a twin-screw ocean telegraph steamer for the Japanese Government. The vessel is fitted with all the latest appliances for laying and repairing telegraph cables. She has twin-screw triple-expansion engines made by the builders. The vessel has been built to the order of his Excellency T. Kato, Imperial Japanese Minister, through Mr. A. R. Brown, Japanese Consul, Glasgow, to Lloyd's survey and Board of Trade passenger requirements, and under the superintendence of Mr. George McFarlane, engineer, Glasgow, and Captain Periam. On leaving the ways she was named *Okinawa Maru*, by Mrs. James Dixon, Bothwell.

**Kiev.**—On February 18th Messrs. James & George Thomson, Limited, Clydebank, launched the *Kiev*, a twin-screw steamer of 5,400 tons, built to the order of the Russian Volunteer Fleet for their cargo and passenger service between the Black Sea and Vladivostok. The *Kiev* is a sister ship to the *Vladimir*, launched recently, and is 419 ft. long, 49 ft. 6 in. broad, and 32 ft. deep. Under the poop is accommodation for a limited number of first-class passengers, while the whole of the main deck is devoted to quarters for third-class passengers or troops. There is a complete installation of electrical ventilating fans, besides other modern appliances calculated to promote the comfort of passengers. The machinery consists of two independent sets of triple-expansion engines, each driving a bronze screw, and a fair rate of speed is expected. Captain Poiré, Mr. Anselm, constructor, and Mr. Sivokononki, engineer, superintended the construction of the vessel. Miss Sivokononki performed the christening ceremony.

**St. Austell.**—On February 19th Messrs. William Simons & Co., Renfrew, Limited, launched complete the *St. Austell*, the second of the two very powerful barge-loading dredgers recently constructed to the order of the British Admiralty. The vessel, which is to be employed at H.M. Dockyard, Devonport, is of the following dimensions:—Length, 195 ft.; breadth, 35 ft. 6 in.; depth, 18 ft. The *St. Austell* is propelled by two sets of compound surface-condensing engines of 1,000 I.H.P. (either set of engines being available for dredging) and has all the latest improvements in dredging appliances. The gearing is specially adapted for rock dredging and the bucket ladder works to a depth of 46 ft. below water. Its place in the yard will be occupied by a hopper dredger for Wexford, recently ordered by the Wexford Harbour Commissioners.

#### LAUNCH.—NORWAY.

**Victoria.**—On February 15th there was launched from the yard of the Bergens Mekaniske Værksted, Bergen, a steel screw steamer of the following dimensions:—Length, over all, 226 ft., breadth, moulded, 31 ft. 6 in., depth, 15 ft. 3 in. The ship is built to the highest class in the Norwegian Veritas, and has raised quarterdeck, bridge and topgallant fore-castle, double bottom for water ballast in main and after holds, and

peak tank aft, steam steering gear, steam windlass, three steam winches, donkey boiler, &c. Every modern improvement has been embodied in her construction and outfit. She is built especially for the Baltic wood trade. The engines are triple-compound, with cylinders 15½ in., 25 in., and 42 in. diameter, by 30 in. stroke. One steel boiler, constructed for a working pressure of 160 lbs. per square inch. Speed about nine knots. The ship was named *Victoria*, and is built to the order of William Hansen, Esq., of Bergen. The keel of a sister ship will immediately be laid in the vacated berth, for the same owner.

#### TRIAL TRIPS.

**Holgate.**—On January 29th the s.s. *Holgate* had her trial trip in Hartlepool Bay. The *Holgate* has been built by Messrs. William Gray & Co., Limited, for the London and Northern Steamship Co. (Messrs. Pyman Bros., London, managers). She is a fine steamer, built to Lloyd's highest class, and her dimensions are:—Length over all, 329 ft.; breadth, 44 ft., and depth, 28 ft. 3 in. She carries over 4,100 tons deadweight on a draught of about 19 ft. Triple-expansion engines, having cylinders 23 in., 36 in. and 62 in. in diameter by 89 in. stroke, and two large steel boilers working at 160 lbs. pressure per square inch, have been supplied by the Central Marine Engine Works of William Gray & Co., Limited. Captain T. Pyman and Mr. William Cromar have superintended the construction of the vessel and her machinery on behalf of the owners. The trial was in every respect a most successful one, Mr. Cromar being present on behalf of the owners, and Mr. Lindsey representing the engine builders. On its conclusion the vessel proceeded on her voyage to Cardiff, to load for the River Plate.

**Rudelsburg.**—On Friday, January 31st, the steel screw spar deck steamer *Rudelsburg*, built by Sir Raylton Dixon & Co., Cleveland Dockyard, Middlesbrough, for Messrs. The Hansa Steamship Co., Bremen, was taken out to sea for her official trial trip under the command of Captain Zittlosen. Her dimensions are:—Length, 323 ft.; beam, 42 ft. 6 in.; depth moulded, 25 ft. Great care has been taken in the construction of the vessel so as to meet the company's requirements for their River Plate trade. The poop, bridge and fore-castle decks are of teak, and handsome accommodation is provided for captain, officers and engineers in houses on bridge deck. Triple-expansion engines, built to German law requirements have been fitted by Messrs. T. Richardson & Sons, Limited, Hartlepool, having cylinders 22½ in., 36 in. and 62 in. by 42 in. stroke, with two large single-ended boilers working at 200 lbs. pressure. The hull and machinery have been constructed under the supervision of Mr. D. Wulff, superintendent engineer for the Hansa Co. During the trials everything worked most satisfactorily and the vessel proceeded direct to Bremen.

**Viper.**—On January 31st the official trial trip was made with the sea-going torpedo boat *Viper*, built for the Imperial and Royal Austro-Hungarian Government by Messrs. Yarrow & Co., Poplar, in the presence of Chevalier Leopold von Jedina, Naval Attaché to the Austro-Hungarian Government; Captain Padevit, Mr. Krainer, Engineer-in-Chief to the Austrian Navy; Lieutenant Schwarz, commander of the *Viper*; M. Thiel, naval architect; and Mr. Nitech, engineer of the *Viper*. This vessel is 147 ft. 6 in. long by 14 ft. 9 in. beam, and guaranteed to attain a speed of 24 knots when fully equipped and loaded, with 26 tons to represent armament. The *Viper* left Messrs. Yarrow & Co.'s yard at 10 o'clock in the morning, and commenced her three hours' trial about noon at Thames Haven. During the middle of the three hours' trial six runs were made on the measured mile, during which the mean speed attained was 26.638 knots, and the mean speed for the three hours' continuous run was 26.638 knots—i.e., 2.638 knots in excess of the contract speed. The vibration was practically nil at all speeds, the machinery being balanced on the system first introduced by this firm. After the run the usual manoeuvring trials were carried out, all of which proved satisfactory. The boilers are of the Yarrow type, with straight tubes and no outside down pipes. The above results were obtained with an air pressure in the stokehold averaging ¾ in. of water.

**Richmond.**—On January 31st the new steamer *Richmond*, recently built by Messrs. Ropner & Son, of Stockton-on-Tees, to the order of the Britain Steamship Co., Limited, London,

left the River Tees on her trial trip. Mr. Spence, the company's inspector, expressed himself highly pleased with the behaviour of the steamer, and also with the satisfactory working of her machinery during the trial run. After the compasses had been duly adjusted in the bay the steamer proceeded on her run round to Newport (Mon.) to load for Rio.

**Dover.**—On January 31st the paddle steamer *Dover*, built by Messrs. William Denny & Brothers, Dumbarton, and engined by Messrs. Denny & Co., for the London, Chatham and Dover Railway Co. for their cross Channel service between Dover and Calais, went on her long trials between the Cloch and Cumbrae Lights. It is of interest to note that the grandfather of the Dennys built the *Rob Roy*, the first cross-Channel steamer, 75 years ago, which at that time attained only a speed of from 7½ to 8 knots per hour, whereas the *Dover*, on four runs between the lights, attained a mean speed of 19.49 knots. There were present, and representing the owners, Captain Morgan, R.N.; Mr. Kirkby, Mr. Messenger, and Mr. Miroh; and representing the builders and engineers, Mr. Walter Brock, Colonel Denny, M.P.; Messrs. Archibald Denny, John Ward, James Denny, H. Brock, &c. On the home run Colonel Denny proposed, "Success to the Owners," emphasising the pleasant relations they had had with the representatives of the London, Chatham and Dover Railway Co. Captain Morgan, in replying, expressed his entire satisfaction with the steamer and her performances, and in a few happy remarks gave the toast of "The Builders," for whom Mr. Walter Brock replied. The whole day's proceedings were very pleasant. The principal dimensions are:—Length, between perpendiculars, 280 ft.; breadth, moulded, 35 ft.; depth, from promenade deck, 22 ft. 8 in.; with a gross tonnage of 979. She is built of steel, and the hull is subdivided into nine watertight compartments by bulkheads extending to the main deck. There is an upper deck extending the full breadth of the vessel, forming a roomy and comfortable promenade for passengers in fine weather and an effectual shelter against storm or rain. At the extreme after end there is a combined steam and hand steering gear, by Messrs. Brown Brothers, of Edinburgh, controlled from the flying bridge by means of Brown's patent telemotor. This gear acts direct on the stock of the after rudder, which is entirely constructed of steel, and built into the form of the ship. The forward rudder is worked by a powerful hand gear situated amidships. This rudder, which is also built to the form of the ship, enables the vessel to be safely and rapidly backed out of harbour even in heavy weather. There is no counter, the stern being specially designed for backing against a rough sea. On the main deck, at the after end, there is a very comfortable smoking-room. Forward of this is a range of state-rooms, finished in white enamel and suitably furnished. Two special cabins are fitted here, having richly decorated panelling framed in polished sycamore and being upholstered in silk tapestry of chaste design. Beyond this a handsome stairway leads to the main saloon. The fore end of the main deck forms a sheltered promenade for second-class passengers, and contains accommodation for the petty officers. Upon the lower deck aft is the main saloon, tastefully finished in ivory enamel relieved in gold. A roomy restaurant, panelled in painted pine with linocrusta panels, and fitted with large dining-tables, occupies the space immediately forward of the main saloon. The ladies' cabin, situated forward of the restaurant, is a cosy apartment, having panelling of a similar nature to that of the main saloon. It is handsomely furnished. Accommodation is provided for the second-class passengers in a well-lighted and ventilated saloon on the lower deck forward. The vessel is lighted throughout by electricity on the Edison-Swan system, the plant and fittings being supplied by that company, and fitted by the builders' electrical department. Besides the internal lights there are four large embarkation lamps, a feature which will be much appreciated by passengers travelling by the night service. A complete system of electric bells is also fitted throughout the first-class passenger accommodation. During the winter the vessel will be heated by means of stoves, and an elaborate system of steam heating by the builders' "D.S.S. patent radiators," capable of maintaining a comfortable temperature even in the coldest weather. The propelling machinery, which has been constructed by Messrs. Denny & Co., consists of a set of triple-expansion diagonal engines, supplied with steam by four tubular boilers at a working pressure of 150 lbs. per square inch. The cylinders have cast-steel pistons and forged-steel piston rods. The high and intermediate pressure cylinders are

fitted with piston valves, while the valve on the low-pressure cylinder is of the usual double-ported type with an equilibrium ring on the back. The connecting rods, caps, and bolts are of ingot steel, and the crank pin brasses are lined with white metal. The valve-gear is of Mr. Brock's special design, with cast-steel rocking quadrant, arranged so as to keep the lead constant for all grades of expansion. All the shafting is of ingot steel. The engines are controlled by Brown's patent combined steam and hand-reversing gear, and the steam is regulated by a large double-beat valve, worked by screw and lever gear from the starting platform. The paddle-wheels are fitted with steel feathering floats, and are of great strength. Two independent centrifugal pumps are fitted for circulating purposes, and are capable of drawing water from the bilges if required. The feed pumps consist of a pair of Weir's direct-acting pumps, discharging through a feed filter. The boilers are of steel, with Fox's corrugated furnaces and iron tubes. They are worked by forced draught on the closed-stokehole principle, air being supplied by two fans. The base of the funnel is fitted with Denny & Brace's patent apparatus for catching the sparks and ashes, which are a source of annoyance and discomfort in most steamers having forced draught. In her trials on the measured mile at Skelmorlie the *Dover* attained a mean speed of 19.36 knots, the machinery working throughout with perfect smoothness and a total absence of vibration. The speed on service of the vessel is intended to be 18 knots, and with this margin she should very easily maintain it.

**Lisnacrieve.**—On Saturday, February 1st, the large rewer steamer *Lisnacrieve*, owned by Messrs. Hunting & Son, Newcastle-upon-Tyne, went upon her official trial trip off the mouth of the Tyne. The vessel has had her machinery converted from the compound two-crank type to the three-cylinder three-crank type by the addition of new cylinders and a complete new high-pressure engine forward, together with new steel boilers for 160 lbs. working pressure. The alterations have been made by the North-Eastern Marine Engineering Co., Limited, at the Wallsend Works, under the supervision of Captain Brunton and Mr. Taylor, the owners' representatives. The official trial over the measured mile—the vessel being fully laden—indicated an average speed of ten knots. Mr. Hunting, who was present at the trial, expressed great satisfaction at the results attained, as also at the expeditious and successful manner in which the work had been carried out. The North-Eastern Marine Engineering Co. was represented on the trial by Mr. S. Hunter, manager, and Mr. D. Myles.

**Nanshan.**—The s.s. *Nanshan*, built by the Grangemouth Dockyard Co., for Messrs. Richardsons, Great St. Helen's, London, went down the Firth of Forth lately on her official trial trip. Her dimensions are 297 ft. by 39 ft. by 24 ft. She is built to the three-deck rule, with poop bridge and forecabin, and classed 100 A1 at Lloyd's under their special survey, carries a deadweight of 3,400 tons on a light draught, and is fitted with water ballast in afterhold, deep tank amidships, and in peak tanks. Her engines, which were supplied by Messrs. Hutson & Son, are of the triple-expansion type, having cylinders 28 in., 38 in., and 61 in. by 42 in. stroke, with two large boilers. The vessel has steam steering gear by Clarke, Chapman & Co., Limited; direct steam windlass by Emerson, Walker & Co., Limited, fitted with cargo ports, four steam winches, and appliances for rapid loading and discharging of cargo. The vessel has been specially built for the Eastern trade passenger certificate, and is arranged for carrying emigrants, with very extensive ventilation, and built to the Board of Trade for passenger certificate. The *Nanshan* on the measured mile attained a speed of fully 13 knots, the engines working smoothly throughout. Mr. T. Richardson, one of the owners, who was present with a party of friends, expressed himself as highly satisfied with the ship and result of the trial. The vessel has been built under the superintendence of Mr. J. H. Buchanan, Leith and Glasgow.

**Cowrie.**—On February 4th this vessel was taken for her trial trip from Messrs. Sir W. G. Armstrong, Mitchell & Co.'s yard, Walker. The *Cowrie*, which has been built to the order of Messrs. M. Samuel & Co., of London, is, along with her sister ship, *Nerite*, the largest tank steamer afloat, and is 375 ft. long, 48 ft. beam, by 31 ft. 6 in. moulded depth. Like the rest of the same fleet she has been specially constructed under the supervision of Messrs. Flannery, Baggallay & Johnson, of London and Liverpool, for the double duty of carrying oil in bulk to



the East, and returning to European ports with general cargoes of fine goods. She is fitted with ample engine and boiler power, her engines having cylinders 27½ in., 43½ in., and 73 in., by 48 in. stroke, and on her trial trip these developed about 2,000 H.P. Her auxiliary machinery is of the most complete character for the quick discharge and loading of general cargo, and the vessel is also fitted with a very powerful pumping and mechanical ventilating plant. Electric light, including searchlight for use in the Suez Canal, has been fitted. The speed attained on the trial trip was over 11½ knots, and everything about the engines and boilers worked without a hitch, and steam was easily kept. A feature of the trial was the thorough testing of all auxiliary gear, which was found to work to the satisfaction of the company's marine superintendent, Captain Condon, and the superintending engineers.

**Anapa.**—On February 5th the s.s. *Anapa*, built by Palmer's Shipbuilding and Iron Co., Limited, to the order of Mr. James Marke Wood, was taken to sea for her official steam trial. Her dimensions are as follows, viz.:—Length, between perpendiculars, 350 ft.; beam, moulded, 45 ft.; depth, 28 ft. 6 in. She has been built under special survey to class 100A in Lloyd's Register, and is of the spar deck type, having a poop, bridge, and forecastle. Two complete steel decks are laid, extending all fore and aft. The poop is fitted for cargo, the officers and engineers being berthed on the bridge in a large steel deck house, and the crew in the forecastle. Water ballast is provided for aft in a cellular bottom and in a deep hold tank amidships. All the necessary requirements to fit the vessel for general and grain cargoes are complied with, and all the most modern improvements for the safe handling of the vessel, and rapid loading and discharging of cargo, are supplied and fitted throughout. The engines and boilers, which have also been built by the Palmer's Co., are of the triple-expansion type, with cylinders 24 in., 40 in., and 64 in., by 45 in. stroke, and two large steel boilers, working at a pressure of 180 lbs. per square inch. The vessel is designed to load a deadweight of about 5,500 tons on Lloyd's summer draught, and has been constructed under the personal supervision of Mr. Maxwell Hill, naval architect, of Newcastle. During the trial the engines worked at 85 revolutions per minute in a highly satisfactory manner, and a mean speed of 12 knots was attained on the measured mile, after which the vessel returned to Howdon Dock to receive her bunkers.

**Hyson.**—On February 15th this vessel proceeded down the Belfast Lough to undergo her trial trip at the hands of the builders, Messrs. Workman, Clark & Co., Limited, previous to taking her place among the fleet of the China Mutual Steam Navigation Co., of London, for whose trade with China the vessel has been specially designed and equipped. The *Hyson* is the third of three similar vessels completed by the Belfast firm, and brings the total number of steamers built by Messrs. Workman, Clark & Co., Limited, alone, for this firm, up to five. The dimensions of this vessel are:—Length, 410 ft.; breadth, 48 ft.; depth, 30 ft. 5 in.; gross tonnage, 4,450 tons, and capable of carrying a very large deadweight cargo. Lloyd's highest class and Board of Trade Passenger Certificate requirements are complied with. The facilities for loading and discharging cargo are made a special feature in these steamers, and the larger hatches are arranged so that four derricks can be working from them at the same time. For navigating the vessel at sea and in harbour auxiliary machinery of the latest types is provided. In addition to the upper and main decks there are poop, bridge, and forecastle erections, with teak decks. The forecastle containing the crew's quarters with a galley, washhouses, &c., for their use. On the bridge deck, which extends for a length of 110 ft. amidships, is placed in steel deckhouses, the rooms for the captain, officers, and passengers, with a saloon tastefully and comfortably fitted up, and heated by an arrangement of steam pipes. The lighting throughout is provided for by an installation of electric lighting, including search lights, &c. The machinery, capable of developing a large I.H.P., has been constructed also at the builders' engine works, the engines being of the most approved triple-expansion order and supplied with steam at a high pressure from large double-ended boilers, fitted with forced draught on Howden's system. The various auxiliary engines, pumps, &c., in connection with this department are in accordance with the best practice. A company representing the owners and builders were on board during the day, and after some cruising in the Lough, trials were made of the

vessel's speed, when the average of 14½ knots was obtained. During the construction of the *Hyson* and her sister ships, the charge of superintending has been carried out by Captain Hogg of the owner's company. The party on board having landed, the vessel steamed for Glasgow to load for her maiden voyage.

**Princess Beatrice.**—On Saturday afternoon, February 15th, there was launched the new palace steamer the *Princess Beatrice*. The *Princess Beatrice* has been built by Messrs. Tom Tagg & Sons, Tagg's Island, Hampton Court, for the highest class of river traffic only, and is specially adapted for large or small parties. She has a handsome and large saloon aft, 24 ft. long, capable of dining about 40 people, fitted with mirrors, settees, cupboards, and panelled in choice maple, walnut, and other woods, with hand-painted panels. The ceiling is panelled in similar style, and a first-class full-size cottage piano will be supplied. There is a head room of 6 ft. 10 in. Accommodation will be provided for serving luncheons or light hot dinners on board if required. Light is freely admitted through bevelled plate-glass windows of ample area. The fore saloon, 16 ft. long, is decorated in ebony and maple, with large mirrors, and sunk panels and alcoves. There are lavatories and conveniences for ladies and gentlemen, and further forward a roomy fore-castle for the crew. The fore promenade deck is very spacious, as is also the after deck. The engines are of the compound surface-condensing type, by Paul, of Dumbarton, with special reversing gear. The boiler is by John Stewart & Sons, Limited, of Blackwall, and has been passed by the Board of Trade for a working pressure of 150 lbs. to the square inch; it is of steel, 6 ft. 8 in. long by 6 ft. 8 in. in diameter, fitted with all the latest appliances, and has a large copper funnel. The hull, cabins and arrangements have been designed by Mr. Tom Tagg. The construction of the *Princess Beatrice* is carvel, and of the best selected 1½ in. teak; it is copper-fastened throughout, and has oak keel and stringers. The stern of the boat is fitted with a patent gear specially arranged for passing over the sills of locks and shallows. After the christening the *Princess Beatrice* glided into the water in capital style.

**Chow Tai and Wong Koi.**—The steamers *Chow Tai* and *Wong Koi* have lately been completed by the Fairfield Shipbuilding and Engineering Co., Limited, and handed over to the owners, the Oriental Steamship Co., Limited. The vessels are classed in the highest grade in the Bureau Veritas and under the Board of Trade survey; they are fitted out with all the latest improvements for handling cargo, and have limited accommodation for first-class passengers, and they will form valuable additions to the Scottish Oriental Co.'s extensive fleet trading in Chinese waters. After very satisfactory trials, both vessels left the Tail of the Bank for Cardiff, en route for China.

**Hai-Mun.**—On February 17th the trial trip of the screw steamship *Hai-Mun* took place. The vessel has been built for the Douglas Steamship Co., Limited, Hong Kong, by Messrs. W. Hamilton & Co. The dimensions of the vessel are:—Length, 240 ft.; breadth, 35 ft. 6 in.; and depth, moulded, 19 ft. The class is highest in Lloyd's. The vessel is fitted with triple-expansion engines by Messrs. Hutson & Son, Glasgow, with cylinders measuring 22 in., 35 in., and 55 in. diameter respectively. The boilers will work at a pressure of 160 lbs. The N.H.P. is 200. The vessel is handsomely equipped the saloons being furnished in maple and oak, and the carving and colouring are extremely chaste. It is amply supplied with hot and cold water baths, the system of heating used being on the most improved principle. The *Hai-Mun* has been fitted throughout with electric light by Messrs. William Harvey & Co., electrical engineers, Glasgow, and has accommodation for 160 first-class passengers and 600 native passengers between decks. The managers of the Douglas Steamship Co. are Messrs. Douglas, Lapraik & Co., the oldest firm in the Chinese trade. The *Hai-Mun* (which was built under the superintendence of Captain F. Ashton) is intended for the coast trade, and will ply between Hong Kong, Swatow, Tainbui, and Formosa. Its cargo will be principally tea. One of the most interesting and quite a novel feature of this latest addition to the company's fleet is the plan adopted for securing the boats. This invention, which seems far in advance of anything in the same line hitherto accomplished, is the outcome of the joint efforts of Mr. J. W. Hamilton and Captain F. Ashton. The boats are secured on the rail of the shade deck of the steamer, and the inventors hold that they can be got into the water from the stowed sea position they occupy in a shorter time than by any other plan yet devised. There are

half a dozen boats, and the company were given an illustration of the efficacy of the new arrangement. One of the boats was lowered from its position into the water in the marvellously short time of one minute and ten seconds; whereas, under the system generally in vogue, the proceeding occupies several minutes. Remarkable as this experiment was, the inventors hope that the lowering of the boats may be accomplished in even less time. The trial trip was completely successful. The party embarked from Gourcock by means of a tender, and the vessel sailed down the Firth, rounding the Cumraes. The guaranteed speed of *Hai-Mun* is  $12\frac{1}{2}$  knots an hour. The average speed was  $13\frac{1}{2}$  knots, and it is expected the vessel will be capable of going at 14 knots.

**Manzanillo.**—On Tuesday, February 18th, the s.s. *Manzanillo*, which has been built by Messrs. Craig, Taylor & Co., Thornaby-on-Tees, to trade on the coast of Mexico, had her trial trip, which proved highly satisfactory. She is a full-powered vessel and realised a speed of over 11 knots, being  $1\frac{1}{2}$  knots in excess of the guaranteed requirements. She is fitted with accommodation for a large number of both first and second-class passengers, and is also arranged to carry two quick-firing guns on her fore-castle. The saloon is most charmingly fitted up with plate glass in sized mirrors, which, with the electric light, produces a very fine effect. She has also a strong room, bullion and mail room. She is equipped with steam winches by Messrs. Roger & Co., who also have supplied the steam steering gear; patent steam windlass by Messrs. Emerson, Walker & Thompson Bros. The electric light, which has been fitted throughout in a very complete manner, is by Holmes & Co., of Newcastle, and showed to very great advantage on the trial. The engines, which worked exceedingly well without a hitch, are from the shops of Messrs. Westgarth, English & Co., Middlesbrough.

**Baluchistan.**—The *Baluchistan*, a fine steel screw steamer, built by Messrs. Wm. Gray & Co., Limited, to the order of Messrs. F. C. Strick & Co., Limited, of Swansea and London, left the port of West Hartlepool on February 19th for her trial trip. The vessel has been built to Lloyd's highest class, is 300 ft. in length, 42 ft. in breadth, 19 ft. 9 in. deep. The deck erections consist of poop, raised quarterdeck, and partial awning deck. A handsome saloon, state-room, and accommodation for captain and officers have been fitted up in the poop, and comfortable quarters for the engineers amidships, and for the crew forward. The hull is built with a web frame and a cellular double bottom, and there is also a large ballast tank in the after peak. Four steam winches, large donkey boiler, steam steering gear amidships, hand screw steering gear aft, direct steam windlass, schooner rig, boats on beams overhead, and all modern appliances have been fitted. The engines are of the triple-expansion type, supplied by the Central Marine Engine Works of Wm. Gray & Co., Limited. The cylinders are 22 in., 35 in., and 59 in. diameter, with a piston stroke of 39 in. The boilers are of steel, of large size, and give an ample supply of steam, the working pressure being 130 lbs. per square inch. The vessel left the harbour about six o'clock in the morning, and after manoeuvring in the bay for some time and having her compasses adjusted, was boarded about 10.30 a.m. by a party of inspecting engineers and others. The engines were then put full speed ahead, and a continuous run of between two and three hours made, the performance of the vessel and her machinery being highly satisfactory. The owners were represented by Captain Rosser and Mr. Archibald Walker, the latter gentleman having superintended the construction of the vessel and her machinery; the shipbuilders by Captain Murrell; and the builders of the engines by Mr. Lindsay. On the conclusion of the trial the *Baluchistan* proceeded to London, where she takes in part of the cargo for her first voyage.

**Princess.**—On February 19th the trial trip of the steamer *Princess*, which is destined for Central African transport work, took place at Greenock. She is a stern-wheel steamer, 85 ft. long, and draws only 13 in. She was built by Messrs. John G. Kincaid & Co., Greenock, to the order of the African Lakes Corporation, Limited, 82, Buchanan Street, Glasgow, for service on the Zambesi and Shire Rivers, East Africa. The party on board included Mr. Ewing, one of the directors, and Mr. Moir, secretary of the company; Mr. Joseph Russel, Mr. Kincaid, and a number of ladies and gentlemen. With this steamer the African Lakes Corporation are also sending out other

two vessels which are being built at Whiteinch, one of a similar type, for service on the upper reaches of the Shire River, and the other, a screw steamer to be named *Queen Victoria*, for service on Lake Nyasa. This latter steamer will be the largest and best equipped vessel on that lake. As an experiment for road transport the corporation are sending out a traction-engine with two waggons for the transport of goods past the Marchion Cataracts of the Shire, thus connecting the steamers of the Zambesi and Lower Shire with those on the Upper Shire and Lake Nyasa. Should this important essay prove successful it will mark a further material advance in the progress of Nyasaland, which is being developed so rapidly.

**Wolfsburg.**—On Thursday, February 20th, the steel screw spar deck steamer *Wolfsburg*, built by Sir Raylton Dixon & Co., Cleveland Dockyard, Middlesbrough, for Messrs. The Hansa Steamship Co., Bremen, was taken out to sea for her official trial trip under the command of Captain Pfeiffer. Her dimensions are—Length, 323 ft.; beam, 42 ft. 6 in.; depth, moulded, 25 ft. Great care has been taken in the construction of the vessel so as to meet the company's requirements for their River Plate trade. The poop, bridge and fore-castle decks are of teak, and handsome accommodation is provided for captain, officers and engineers in houses on bridge deck. Triple-expansion engines built to German law requirements have been fitted by Messrs. T. Richardson & Sons, Limited, Hartlepool, having cylinders 22½ in., 36 in., and 62 in. by 42 in. stroke, with two large single-ended boilers working at 205 lbs. pressure. The hull and machinery have been constructed under the supervision of Mr. D. Wulff, superintendent engineer for the Hansa Co. During the trials everything worked most satisfactory and the vessel proceeded direct to Bremen.

## Reviews.

*Lean's Royal Navy List.* London: Witherby & Co. Jan., 1896.

THE present work is one which now needs little recommendation, save that which its own pages furnish. As a work of reference and as a record of the biographical details of the officers of Her Majesty's Navy, and of the auxiliary naval forces, this compilation has no rival. Issue by issue the personal details are added to, and the accuracy of the information insured in cases where there has appeared any opening for a doubt. The present issue contains for the first time information—supplied from official sources—as to the services achieved and awards granted in seven recent engagements in various parts of the African Continent. At the present time, when public attention is so largely directed to the Navy and its affairs, we can confidently say that this volume is one of the most useful and interesting books of reference that can be kept on the library table.

*Calvert's Mechanics' Almanack for 1896.* Manchester: John Heywood & Co. 1896.

WE have received the twenty-third issue of this publication. It contains the usual information found in calendars, with some interesting biographical notes on the lives and works of some of the great engineers whose births are noted in the body of the calendar. There are also a large number of tables and formulæ which are sure to be found useful by the mechanic and the engineer. These include notes on the strength of materials, duty of pumps of various sizes, rules as to the strength and management of boilers, and notes on gearing and belts. The wrinkles contained on the closing pages seem to have been compiled by one who had considerable experience of the working of a northern factory or engineer's shop.

*A Calendar.*

THE Magnolia Metal Co. is almost as well known for the taste and usefulness of its advertisements as for the excellent material it produces. The latest publication of the company is a hanging calendar with moveable dates, which thus make it not merely available for 1896, but for all subsequent years. The colouring of dark green, printed in silver letters, makes it an ornament to any office, whilst at the same time the qualities of magnolia metal and the telegraphic addresses of its agencies stand boldly out for the use of those who want a consignment of it in a hurry.

*Catalogue.*

We have received a bulky and handsomely bound volume entitled "Electricity, 1896." It is the new issue of the catalogue of the General Electric Co., Limited, whose head offices are in Queen Victoria Street, E.C., and which has branches at Manchester, Newcastle, Glasgow and Birmingham. The present is the eighth edition, and it will soon need a new mode of marking its sections. These already extend to "O," and a year or two more will exhaust the letters of the alphabet. Section "A" deals with the appliances for electric lighting and contains an interesting comparison of the relative cost of lighting with electricity and gas. A dictionary of electrical terms is given and a telegraph code for the use of purchasers. There is also a bibliography of useful works on the subject of the art-science. Section "B" deals with electrical supplies and wiremen's sundries, which include cables, switchboards, lamp-holders, and accessories. Then come dynamos and engines, and these are followed by tools, including those for use in the process of electric welding. Launch machinery is also dealt with, and the kitchen is attacked and apparently occupied. "For," says the writer of the introduction to the heating and cooking section, "it will be found that the cost is in no way prohibitive. . . . Many of our central electricity supply stations have already recognised the importance and necessity of this application of current, which will in time materially increase their day load, and have made special concessions for the supply of current for heating, in some instances, 50 per cent. upon their ordinary charges for lighting purposes." The telephone, of course, has a good deal of attention, and some useful hints are given as to how common faults in these instruments arise.

Alarms of various kinds are now available owing to the developments of our electrical knowledge, and these are useful as against fire and its opposite element, water, as well as in the case of other special matters. A large number of surgical and medical appliances are now also in common use, and a list of these is added to the catalogue. Our readers will see from what we have said that the range of the catalogue is most exhaustive. It only remains for us to add that the letter-press is full of drawings of every appliance noted, and that prices and sizes are afforded, so as to make it very easy to find and order the special size best suited to customers' requirements.

*The Engineers' Year Book of Engineering Formulae, Rules, Tables, &c.* By H. R. Kempe. London: Crosby Lockwood & Co. 1896.

We have received the third issue of this most useful pocket-book. Its general plan and excellence have before been put forward in this column, but, beside the usual revision to bring the matter contained up to date, the present issue contains certain additions and excisions. Amongst the additions there is an exceedingly *apropos* note on gold milling. Information is afforded as to the power, water, and labour entailed, per stamp, as well as to the cost of erection. Notes on the old chlorination of ore, as well as the more modern cyanide process of extraction, are also now found in the volume. The general mining section has been revised by an expert. The new matter added regarding the strength of pipes to resist bursting strains—as we prefer to call what is in this volume, and, indeed, generally called the "bursting strength"—is such as will be useful to engineers in many departments. In the department with which we are more especially concerned, it may be remarked, that the formulae and rules given are adapted to the quadruple-expansion engine, which, so far, has not had much time to get into practical service in the Merchant Marine, as well as the, at present, almost universal triple-expansion type. Generally, we may repeat the commendations we have made on previous appearances of this work and say that success has not, so far as we can see, spoiled the volume. It is still trying to keep itself accurate and up to date, and is at the same time striving to reject the less useful part of its formulae and to replace with information of a generally applicable character. That this task is not easy is obvious. We think the aims well realized and those of our readers who make practical use of the volume will be able to say whether our opinion be well founded or not.

*Patent Law and Practice.* By C. F. Emery. London: Effingham Wilson & Co. 1896.

THIS little book is on somewhat wider lines than some of the handbooks which we owe to the same publishers. It is nevertheless modest both in size and price, and it aims at being a hand-

book both for the layman, who is interested in patents, and for the solicitor who has to conduct litigious work for him. The work, as we are told in the preface, is divided into two parts, according as the matter treated of is that which every patentee and inventor should know for his own information and guidance, or belongs to the domain into which the wise outsider never ventures without professional assistance. It is endeavoured to show the rights and liabilities of those to whom the Crown grants letters patent for inventions, and in respect of what matters such letters can be granted, or—what is, if possible, of more importance—in respect of what matters a patent, if granted, can be maintained. The method of proceeding in the obtaining of a patent is explained, and the mode of making a specification is illustrated by a representation of the sort of drawing which must accompany the specification. The procedure when opposition is made to a grant is followed out, and the rights of the applicant, when he has succeeded in getting a patent, are set out. The mode of amending specifications and of granting licences is detailed, but the mode of forcing a recalcitrant patentee to grant a compulsory licence is not, for the most excellent of reasons, there is no precedent in that matter; the Board of Trade never yet having been asked to proceed to compel the grant. Here is a chance for an intrepid adventurer, who wishes to obtain fame as the godfather of an important leading case on patent law. Then the various actions which are generally resorted to in this branch of litigation are discussed and the mode of trial resorted to is exemplified. Besides these matters, a good deal of information as to general matters connected with patent law is given, and there are plenty of rules and forms, and extracts from Acts of Parliament. At the beginning of the volume we find tables of statutes bearing on these matters and a long table of leading cases with references to the body of the work and to the reports. The work seems to have been executed by one who has some knowledge of patent law and who has the faculty of compressing a good deal of information into a small space, but at the same time, though the knowledge to be gleaned from the book will always be useful to the inventor, we should strongly dissuade anyone from relying on any book when in difficulty on this complex subject. Take good professional advice. It will be far the cheapest in the long run. Read the book by all means. It will enable you to test the value of the professional advice you buy.

*A Text-book of Marine Engineering.* By A. E. Tompkins. Portsmouth: J. Griffin & Co. 1896.

On the writing of books on the subject of Marine Engineering especially of those which adapt themselves to the use of those who are concerned with the requirements of examiners, there seems to be no end. Yet we can safely say that the up-to-date work of this Royal Naval Engineer fills a niche hitherto unoccupied. Up to date it certainly is. Possibly the most interesting chapter in the volume to the general reader will be the third, in which, in thirty pages, Mr. Tompkins discusses and illustrates the modern return-tube marine boiler, and also several of the more important types of its younger rival with water tubes, as well as the curiously named marine type of locomotive boiler. The chapter on combustion deals in a very practical way with the theory and practice of turning coal into heat and producing steam, and the actual results of firing certain types of grates is gone into. Now that we are about to see a cruiser in the Royal Navy adapted for the consumption of liquid fuel, it would be well if a little more space to this part of the subject were allowed in the next edition of the work. The next chapter, on Boiler Fittings, discusses the usual matters found in such chapters, but it is more comprehensive than previous ones have been. For example, the Thornycroft automatic feed arrangement is explained and illustrated, and mention is made of the protective glasses now fitted to gauge glasses to withstand the high pressures becoming daily more universal. The use and action of the hydrokineter is also gone into, and a touch of the practical man is seen by the final note, where the engineer is reminded to slack his funnel stays to allow for the expansion of the funnel when steam is first got up. But it is in the next chapter, which treats of the care of the boiler, that the thorough practical wisdom of the writer is most clearly apparent. Chapters on the auxiliary appliances now introduced so largely to save the wear and tear of boilers and to promote their efficiency are thoroughly gone into. The engine and its parts are not forgotten, nor are the theory of the and of the propulsion of the ship by a

ventilation and the management of watertight doors, though important in all ships are doubly so in warships, are not disregarded, and the whole is closed by a series of examination papers which prepare the student for the final ordeal. With the contents of this book well digested and understood in his head he may go into the real examination room with a very easy heart. That the book fulfils its purpose of being useful to students—especially for those going into the Royal Navy—and to deck officers, there can be no manner of doubt.

*Notes on a Photographic Method of Determining the Motion of a Gun during Recoil.* By Dr. A. C. Crehore and Dr. G. O. Squier. Fort Monroe, Va. Artillery School Press. 1895.

We have, not very long ago, noticed a paper by these two authors who are in the forefront of those who strive to utilize light as an exact method of measuring small and very rapid differences of time and space. Several methods of applying photography to the needs of the experimenter, according to the exigencies of his work, are given. The initial way of finding out the path of the ray of light in the experiments requires the use of a dark room, but means are given whereby a black screen can be used to give the desired result. Then it is suggested that the sparks from an electrical tuning-fork, proceeding at a known rate of discharge, if used as the source of light for the photographs, would enable the experimenter to determine the speed as well as the path of the object under examination. As, however, the tuning-fork suggestion has its difficulties in practice, the actual experiments were carried out by light admitted to the course of the projectile by a series of minute holes drilled at known distances from one another. The light supplied to them was reflected sunlight.

By means of the experiments which the authors made it has been found possible to determine with exactness the angle of "jump" of various weapons, and by that means to arrive at superior accuracy in the laying of them. This is a matter of great importance to artillerymen, such as the writers of the paper. It would appear to us that the means described might be very usefully applied to the service of engineers, and that the ingenuity which these gentlemen bring to the testing of destructive weapons might easily be turned to the good of the public in other ways. Like their previous work, the present paper is an example of the patience and skill of its producers, and the copies of the negatives taken during their experiments, which are given in an appendix, will not only serve to elucidate the text, but will prove very interesting to those who study the paper.

## Correspondence.

[It must be understood that, in giving insertion to communications under this heading, we do not in any way pledge ourselves to the opinions preferred therein. We will with pleasure insert any letters likely to benefit our readers, either from their intrinsic value or as being calculated to promote such discussion as will elicit facts valuable from their being the result of practical experience.—ED. M. E.]

### UNITED STATES NEW PATENT LAW.

To the Editor of THE MARINE ENGINEER.

SIR,—It will probably be of interest to those of your readers who have been relying on the Patent Law at present existing in the United States—under which they can, as first and true inventor, at any time apply for protection for inventions already published in Great Britain, by specifications or otherwise—to know that certain radical changes are now pending before Congress in the United States as to a revision of their Patent Laws.

One of the most important of the proposed changes in the United States law is to limit the time in which a valid United States application must be made from seven months from the date of filing of the first foreign application, which has matured into a patent, thus conforming and limiting the privileges of alien inventors to those granted by other nations in the International Convention.

The proposed law as it now stands makes no provision for postponing the date on which the same would go into effect, except that it shall not refer to applications pending in the United States Patent Office

at the time the law is approved. The new law might be passed and approved by the President at any time within the next few months, and after such law goes into effect, British or other foreign inventors would find themselves at once barred from applying in the United States for valid protection under patent for such of their inventions as might be over seven months old from the date of original application in Great Britain or in a country other than in the United States.

At present the inventor still holds the privilege that he can obtain a valid patent in the United States at any time after the first application elsewhere, in spite of publication, provided the invention has not been in public use in the United States for more than two years prior to the date of making application in the United States.

Yours faithfully,

1, Queen Victoria Street,  
February 17th, 1896.

FELL & JAMES

### GRATUITY FOR REPAIRS AT SEA.

To the Editor of THE MARINE ENGINEER.

DEAR SIR,—It may interest your numerous readers to know that the engineers of the s.s. *Mara*, of the Demerara and Berbice Steamship Co., have received from the owners and underwriters, on 8th February, a substantial sum of money as a gratuity in recognition of their successfully repairing a broken thrust shaft at sea in May, 1895, whilst on a voyage from Demerara towards Trinidad, West Indies.

I enclose my card, and as I think it worthy of publication, have sent to you, knowing that you take a great interest in marine engineers.

I am, dear Sir,

Yours faithfully,

J. M. NEWALL,

Chief Engineer s.s. *Mara*.

Forest Gate, February 14th.

## Miscellaneous.

**Boiler Covering Compositions.**—Messrs. S. T. Taylor & Sons, who, since 1878 have carried on business as boiler covering contractors, and manufacturers of non-conducting compositions at Gateshead, have removed to extensive premises at Scotswood-on-Tyne, where they intend to largely extend their operations. This step has been rendered necessary through increased demands upon their resources, to meet which more effectually, they have put down in their new premises new plant of special design. The premises, which include suitable offices, are admirably situated in proximity to rail and river. In addition to non-conducting compositions (including asbestos composition which they manufacture themselves and guarantee) the firm are makers of fire-proofing and sound proofing material, and have fire-proofed several important buildings, besides doing insulating work on steamships. Among other specialities of theirs, is the well known "Vulcan cement" for steam joints, &c., and the "imperishable silicate of cotton strips," which are largely supplied for covering cold water pipes to prevent freezing. The firm have a special system of covering high-pressure boilers, &c., which has been applied with the best results in a large number of contracts executed on the North-east coast district, for marine and hot water engineering firms, shipbuilders, colliery owners, &c. The firm regularly undertake covering work so far away from their base of operations as London and Manchester, and they have now in hand a most important contract for covering the boilers, cylinders, steam pipes, &c., on the large steamer *Algoa*, built by Messrs. Doxford & Sons, of Sunderland, for Messrs. Rudolph, Crow & Co., of Liverpool, and which is said to be the largest cargo-boat afloat. It should be added that the firm are sole agents in the North for Messrs. F. Jones & Co., contractors to the Admiralty, and manufacturers of patent British made "silicate cotton" or "slag wool."

**Hull and District Institution of Engineers and Naval Architects.**—On Monday evening, February 10th, the members of the above institution had the pleasure of hearing a paper by Mr. H. J. Rudgard on "The Removal of the Marsh Lane Tunnel, Leeds," the president, Mr. F. H. Pearson, in the chair. A short history of the line was given at the outset, the lecturer

then proceeding with a detailed description of the work of removal of the old tunnel, and erection of the present bridges and tunnel, and the difficulties encountered, and the method of dealing with the traffic, which is here very great—as many as 1,273 trains passing over the line in one week, and on the August Bank Holiday, 1894, 261 trains passed over it in 24 hours—during the progress of the work. The paper was splendidly illustrated by large size diagrams and also by some fine lantern slides. A short discussion followed, in which Messrs. F. H. Pearson, R. Pawley, T. M. Newell and E. Smith took part, Mr. Rudgard replying to the points raised. At the close a hearty vote of thanks was accorded Mr. Rudgard (on the motion of Mr. Pearson, seconded by Mr. W. B. Dixon) for the great care and trouble he had taken in preparing the paper and diagrams.

**Iron and Steel Institute.**—The autumn meeting of the Iron and Steel Institute will be held at Bilbao at the beginning of September. The programme will include visits to the leading iron and steel works, and to the important mines from which so large a proportion of the iron ore used in Great Britain is obtained. Assurances of a hospitable reception have been received from the President of the Provincial Deputation, Don José Maria de Arteche, and from the Alcalde of Bilbao, Don Emiliano de Olano, as well as from the leading ironmasters, mine owners, and engineers of the district. In view of the limited hotel accommodation at Bilbao, arrangements are being made to secure one of the Orient Co.'s steamers to convey the members to Bilbao and back, and to serve as a floating hotel. These steamers are fitted with electric light, baths, smoking-rooms, and the cuisine is first-class. An experienced surgeon is carried, also musicians, stewardesses, and an ample staff of stewards. The routine of meals will be maintained in port, and communication with the shore will be provided without extra charge. The cruise will last a fortnight, and calls will be made at some of the Spanish and French watering places. The passage money will be about 20 guineas, including board on the steamer while in port. The annual general meeting of the Institute will be held, by kind permission, at the Institution of Civil Engineers, on May 7th and 8th next.

**Oil-Firing.**—Having regard to the fact that the question of oil-firing for marine boilers is certain to become an important one in the near future, we are pleased to note that the Admiralty have authorised the adoption of oil fuel in the *Gladiator* a cruiser, the building of which was recently commenced at Portsmouth. In this case the oil is to be carried in bulk, and the containing tanks are to be built as feed tanks.

### Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from January 16th, 1896, to February 13th, 1896.

- 1084 W. Brierley. Lubricators.
- 1096 T. Hampton. Manufacture of steel.
- 1112 D. A. Quiggin. Evaporators, condensers, &c.
- 1113 J. Barbe. Steam boilers.
- 1130 F. Ridgway. Loading and unloading vessels.
- 1138 J. S. Lewis. Rotary engines.
- 1146 L. Doig. Preparing metal.
- 1156 J. W. Fitter. Manufacture of steel tubes.
- 1174 C. W. Summerskill. Non-rustable metallic tubes.
- 1176 J. M. Croom and N. S. Arthur. Lifeboat carriages.
- 1179 A. McFarlane and G. Whitfield. Safety valve.
- 1192 C. W. Dodgin. Water-tube boilers.
- 1217 W. H. Diestelhorst. Dredgers.
- 1245 F. Wilkinson. Water gauges for boilers.
- 1247 A. F. Wilkin. Hydraulic steering apparatus.
- 1259 B. G. Sinclair. Furnaces.
- 1263 P. Crowther. Pumps.
- 1264 T. Williamson. Boilers.
- 1288 E. G. Peyton. Injector.
- 1293 J. A. Main. Corrugated metal sheeting.
- 1306 F. A. R. Neill. Boiler and other furnaces.
- 1308 F. Remmler. Lamp.
- 1314 A. J. Boulton and E. J. Lalande (France). Hydraulic motors.
- 1316 A. J. Boulton (C. J. L. Ott, Germany). Iron and steel.

- 1324 J. H. Lee. Lamps for burning hydro-carbons.
- 1329 A. Welin. Quick-firing guns.
- 1335 H. S. Maxim. Automatic guns.
- 1343 E. Walker. Motor.
- 1346 W. Cotter. Ventilators.
- 1399 S. D. Rowland. Filters.
- 1404 H. Maxim. Producing and utilising motive power.
- 1405 A. F. Abrahamson Rosendorff. Pumps.
- 1442 O. J. Scott. Boiler feeder.
- 1448 J. Buchanan. Steam boiler furnaces.
- 1449 H. Babington. Taps and valves.
- 1456 T. H. Hutchinson. Indicator.
- 1457 C. F. Stearn. Incandescent electric lamps.
- 1463 T. Hewett. Ice-making machinery.
- 1483 H. H. Lake. Valves for engines.
- 1503 B. R. Body. Steam boilers.
- 1513 W. H. Wright. Enabling ships to clear obstacles.
- 1518 H. Edmunds. Distribution of electricity.
- 1545 O. H. Ricketts. Indicator for funnels.
- 1607 W. Hewson and P. C. Davies. Oil lamps.
- 1609 W. E. Heys (Schaffer and Budenberg). Reducing valves.
- 1615 T. G. Blood. Hurricane lanterns.
- 1624 H. D. Booth. Anti-friction and anti-vibration combination washer.
- 1625 G. Hutson and H. McIntyre. Water-tube boilers.
- 1649 F. J. Reinisch. Water-closets.
- 1715 J. W. Ray and R. C. Saxby. Ship's telegraphs.
- 1723 R. B. Fuller. Ventilator.
- 1732 J. R. Rickard. Dovetail cutting machine.
- 1749 W. H. Holehouse. Direct acting pumping engine.
- 1771 J. W., T. T., and E. A. Bouz. Reducing valve.
- 1775 A. I. Gravier. Dynamo machine.
- 1778 C. H. Rouse. Brushes.
- 1788 W. Huk, and H. Laing. Cargo vessels.
- 1787 A. G. Pinfold. Automatic self-opening door.
- 1797 L. Rushworth and A. Fletcher. Furnace door.
- 1826 J. Grimme. Varying the speed of crank shafts.
- 1863 J. Burgermeister. Rotary engines.
- 1892 J. Ockermüller. Anti-corrosive.
- 1895 A. C. Stevenson. Ventilators.
- 1904 E. T. L. Bryers. Distress signalling apparatus.
- 1905 H. Maxim. Furnace blast for treating metals.
- 1908 G. S. G. de Livet. Boilers, furnaces, &c.
- 1917 J. C. Hudson. Fire-extinguishing apparatus.
- 1923 H. Thomson. Water-closet syphon cistern.
- 1944 T. G. Barron. Derrick for ship decks.
- 1950 J. Laidlaw and C. A. Matthey. Centrifugal machine.
- 1999 F. Rossbach-Roussett. Charging vessels.
- 2008 J. A. Fish. Steam boilers.
- 2015 S. S. Hellyer. Water-closets.
- 2071 J. C. Sellars. Time and date indicators.
- 2100 J. C. Love and J. E. Hodges. Furnaces, &c.
- 2113 G. Howard and E. T. Bousfield. Rotary motion.
- 2126 C. Garver. Steam utilising apparatus.
- 2137 E. Reilly. Piston-rod lubricator for engines.
- 2145 J. Rowland. Construction of ships.
- 2149 A. and J. Stewart and Clydesdale, Limited. Riveting.
- 2151 J. Weir. Packing for pumps.
- 2152 J. H. Boulds. Closing watertight doors.
- 2155 J. Shanks. Lavatories.
- 2170 S. E. Morley. Transmission of heat.
- 2192 W. J. Woosley. Water heating apparatus.
- 2194 O. Bondy and A. Jordan. Electric arc lighting.
- 2198 A. F. Yarrow. Feeding of steam boilers.
- 2206 W. J. H. Dalton. Rotary steam engines, &c.
- 2227 F. Clench and T. S. King. Steam motor governor.
- 2231 D. Champion. Propelling small boats.
- 2234 J. Fanstone. Collapsible boat.
- 2241 J. McCain. Anchors.
- 2253 S. Lake. Submarine vessels.
- 2274 J. Fraser. System of aqueous navigation.
- 2277 R. W. Ray. Boat.
- 2379 A. S. F. Robinson. Engine governors.
- 2401 C. and G. K. Craig. Protecting ships' hulls.
- 2428 F. E. Rainey and the Mirrlees, Watson & Yaryan Co., Limited. Water-tube boilers.
- 2491 H. Sidebottom. Screw propellers.
- 2496 L. F. Giers and F. H. Harrison. Steam condenser.
- 2499 G. W. Knowles. Ventilator.
- 2502 A. W. Case. Screw propellers.



- 2510 D. Johnston and W. McAdam. Governing engines.  
 2529 J. Robinson. Stop valves.  
 2583 W. Jordan. Flues and manhole covers.  
 2589 A. J. Boulton. Steam generators.  
 2590 G. F. Cremer. Marine velocipedes.  
 2616 W. R. Cummins. Water-tube boilers.  
 2628 J. Mallinson and W. P. Gibbs. Engine governors.  
 2682 W. B. H. Drayson. Valves for the supply of liquids.  
 2688 W. Tyree. (F. N. Jones, New Zealand.) Shaft tugs.  
 2690 A. J. Boulton. Alarm apparatus.  
 2718 A. E. Cryer. Boiler furnaces.  
 2720 T. S. James. Crank.  
 2774 G. F. Harvey. Propelling boats.  
 2781 F. B. Last and J. R. Wright. Iron and steel.  
 2783 E. G. Pulford. Relief devices for cooking utensils.  
 2786 M. J. Adams. Supporting lavatory basins.  
 2788 W. W. Beaumont. Steam generators.  
 2807 W. H. Griffiths. Steam engines.  
 2868 J. M. Stratton. Steam generators.  
 2876 A. J. Jacobs. Marine propulsion.  
 2881 E. de Riar. Rowlocks.  
 2923 W. C. Johnson, L. J. Steele and J. W. Ewart. Dynamos.  
 2935 J. A. Coghill. Rudders.  
 2936 W. and E. Allday. Portable and other forges.  
 2951 J. Mackenzie. Steam vessel.  
 2957 H. A. Kent. Platinum vessels.  
 2959 W. H. Bradford. Preventing vessels capsizing.  
 2964 R. C. Quin. Wiring for electric installations.  
 2966 D. N. Bertram. Pipe wrench, spanner and the like.  
 2977 E. Lagier. Lock nut and friction washer.  
 3006 G. Bell. Shipping boxes for animals.  
 3007 S. Goldman. Thermometers.  
 3009 E. Stern. Apparatus for closing vessels.  
 3032 H. O. Krapf. Self-acting electrical signalling apparatus.  
 3033 The Pneumatic Painting Machine Corporation, Limited, and H. C. Cleaver. Appliances for spraying oil.  
 3037 W. S. Vaughan. Self-cleaning smoking pipe.  
 3042 E. Makin, jun. Steam generators.  
 3045 J. Blake. Steam boilers.  
 3060 T. Young. Ship's berths.  
 3062 D. G. Taylor. Oil evaporizers.  
 3072 W. Garden. Cooling and circulating air.  
 3077 T. C. Blanchflower. Lubricator for wheels.  
 3112 F. N. Mackay. Refrigerating apparatus.  
 3114 J. West. Pumps.  
 3116 C. J. Thornhill. Cocks.  
 3123 J. C. Hudson. Water-tube boilers.  
 3151 A. T. and F. T. Schmidt. Arc lamp.  
 3152 G. P. Grace. Rotary engines.  
 3153 T. A. Dove and T. Jamieson. Ventilators.  
 3168 W. Fairweather. (The Babcock and Wilcox Co., United States.) Steam generators.  
 3169 W. Fairweather. (The Babcock and Wilcox Co., United States.) Steam generators.  
 3171 H. E. Heys. (J. Milburn, United States.) Vices.  
 3179 J. Heggie and M. Buckley. Lamps, &c.  
 3194 C. A. Skeie. Riveting machine.  
 3212 E. T. Hughes. (W. B. Guild, United States.) Fire-extinguishing apparatus.  
 3261 J. S. Nettlefold. Hydraulic valves.  
 3275 A. E. Alger. Furnace and boiler.

## BOARD OF TRADE EXAMINATIONS.

### Extra First Class.

- February 1st.—Robson, W. H... Ex. 1C N. Shields  
 „ 8th.—Ross, Jno... Ex. 1C Leith  
 „ 1st.—Younger, A. S... Ex. 1C Glasgow

NOTE.—1C denotes First Class; 2C, Second Class.

January 25th, 1896.

- |                               |                                |
|-------------------------------|--------------------------------|
| Allen, F. .... 1C Liverpool   | Campbell, M. L. 2C Cardiff     |
| Anderson, G. H. 1C Aberdeen   | Christie, J. .... 2C Aberdeen  |
| Balfour, S. .... 2C Glasgow   | Cole, N. .... 1C Cardiff       |
| Barclay, J. E. .... 2C Dundee | Collins, J. .... 2C N. Shields |
| Bennion, H. R. 1C Cardiff     | Dalton, J. G. .... 1C Glasgow  |
| Berwick, G. N. 1C N. Shields  | Davies, D. .... 1C Cardiff     |
| Brack, B. .... 2C W. H. pool  | Davies, J. .... 2C Liverpool   |
|                               | Elliott, J. .... 2C „          |

- Gemmell, A. .... 2C Hull  
 Golightly, F. .... 1C Cardiff  
 Gow, W. J. .... 2C W. H. pool  
 Greenwood, T. .... 2C „  
 Henderson, J. .... 2C N. Shields  
 Hill, W. F. .... 2C Liverpool  
 Hosgood, S. D. 2C Cardiff  
 Johnson, T. C. .... 2C Liverpool  
 Kennedy, D. .... 1C W. H. pool  
 Lamb, J. .... 1C Dundee  
 Legender, T. .... 2C N. Shields  
 Lewis, J. .... 1C W. H. pool  
 MacKinnon, F. 1C Aberdeen  
 Marker, W. H. 2C N. Shields  
 Maxwell, R. .... 2C Glasgow  
 McLeod, D. .... 1C „  
 Mollison, R. .... 1C Aberdeen  
 Moore, W. .... 1C Dundee  
 Morgan, W. J. .... 1C Cardiff  
 Murdoch, J. .... 1C Glasgow  
 Nicholson, W. .... 2C N. Shields  
 Pollock, M. M. C. 2C Cardiff  
 Pringle, J. .... 1C N. Shields  
 Rae, J. D. .... 2C „  
 Roberts, J. W. 2C Hull  
 Smith, H. G. .... 1C „  
 Smith, J. F. .... 1C W. H. pool  
 Smith, John .... 2C „  
 Stafford, H. H. 2C N. Shields  
 Stonehouse, J. C. 2C W. H. pool  
 Tait, G. R. .... 1C „  
 Taylor, H. .... 2C Aberdeen  
 Thornburn, J. 2C Liverpool  
 Tuok, J. .... 2C „  
 Watson, Chas. .... 2C Aberdeen

February 1st, 1896.

- Bain, G. W. .... 1C Liverpool  
 Berkley, W. A. 2C N. Shields  
 Gibson, T. H. .... 1C S. derland  
 Ginnetty, M. .... 2C Liverpool  
 Harling, T. C. 1C London  
 Hastings, J. R. 2C „  
 Jungersen, W. F. 1C N. Shields  
 Liston, A. .... 1C Liverpool  
 Macaulay, C. J. 1C „  
 Macfarlane, J. .... 2C S. derland  
 McRobie, F. .... 2C N. Shields  
 Nash, G. .... 2C Liverpool  
 Robinson, J. H. 2C N. Shields  
 Rusden, J. R. .... 2C Falmouth  
 Rusden, R. L. 1C „  
 Walker, W. W. 2C N. Shields

February 8th, 1896.

- Allsop, A. C. .... 2C Liverpool  
 Atkins, W. H. .... 2C London  
 Balfour, J. .... 1C „  
 Berry, F. R. .... 1C Cardiff  
 Bramwell, A. .... 2C „  
 Clarke, G. E. .... 1C Liverpool  
 Coplin, J. E. .... 2C London  
 Doughty, J. .... 2C Liverpool  
 Eaton, A. .... 1C „  
 Fothergill, J. M. 2C N. Shields  
 Gardner, J. .... 1C „  
 Goodwin, A. .... 2C Glasgow  
 Hampton, W. C. 2C London  
 Heznell, R. .... 1C N. Shields

- Hodgson, J. E. 2C Liverpool  
 Howell, S. F. .... 2C Cardiff  
 Hutton, J. W. .... 2C N. Shields  
 Kidd, R. .... 2C „  
 Lane, C. .... 2C Hull  
 Lee, John E. .... 1C Liverpool  
 Lloyd, C. N. .... 2C „  
 McArthur, J. D. 2C Glasgow  
 McBride, J. .... 1C „  
 McDowall, W. 2C „  
 McNair, Allan. 1C „  
 Murray, A. .... 2C Liverpool  
 Murray, J. .... 1C N. Shields  
 Reid, G. .... 2C Glasgow  
 Robertson, C. M. 2C „  
 Robertson, D. .... 1C „  
 Robertson, J. H. 1C „  
 Scott, A. .... 2C N. Shields  
 Service, W. D. .... 2C Cardiff  
 Smith, G. J. .... 2C Liverpool  
 Steer, J. .... 1C Glasgow  
 Venables, T. .... 2C Cardiff  
 Weeks, J. T. .... 1C Hull  
 Williams, McW. 2C London  
 Wilson, J. T. .... 2C N. Shields  
 Wilson, W. .... 1C Cardiff  
 Wright, W. G. .... 1C Glasgow

February 15th, 1896.

- Barrett, W. J. .... 2C London  
 Battle, A. E. .... 2C „  
 Begg, J. S. .... 2C Leith  
 Bergh, H. O. .... 2C London  
 Bowen, W. .... 2C Liverpool  
 Bremner, W. S. 2C Greenock  
 Drysdale, J. .... 1C Leith  
 Drysdale, W. A. 2C Liverpool  
 Fowle, J. S. .... 1C London  
 Fraser, A. .... 1C Leith  
 Haigh, W. .... 1C London  
 Heil, P. J. .... 2C „  
 Hill, J. B. .... 1C Greenock  
 Hunter, P. J. .... 2C Leith  
 Ives, W. T. .... 2C London  
 Izett, G. .... 2C Leith  
 Kellow, J. H. J. 2C Liverpool  
 Kennedy, T. W. 2C N. Shields  
 Law, C. .... 1C Leith  
 MacKay, G. .... 2C Greenock  
 MacKay, H. J. S. 1C „  
 McGee, M. .... 1C „  
 McGuire, W. G. 1C London  
 Mead, J. B. B. 1C N. Shields  
 Minchin, W. G. 2C Liverpool  
 Murray, W. M. 2C Greenock  
 Nichol, T. .... 2C N. Shields  
 North, Barthol. 1C Dublin  
 Paterson, A. .... 1C Greenock  
 Pilmer, J. G. .... 2C N. Shields  
 Potts, G. .... 2C „  
 Pringle, D. W. .... 2C „  
 Quick, B. A. .... 1C London  
 Robertson, T. .... 1C Leith  
 Sides, C. N. .... 1C Liverpool  
 Still, W. .... 1C London  
 Watson, J. .... 2C Leith  
 White, T. .... 1C Liverpool  
 Williams, J. S. 2C London  
 Young, A. .... 2C Leith

**The North German Lloyd.**—The German Government will seek powers next session to extend and increase the subvention granted to the North German Lloyd with the view of assisting its service in the extreme East. The subvention, as originally granted, was for a term of 15 years, expiring in July, 1901. It is now proposed to double the subsidy, the company, at the same time, undertaking to double its service.

**The Institute of Marine Engineers.**—The annual meeting of members will be held at 58, Romford Road, Stratford, on Friday, March 13th, 1896, at 7 p.m., when it is hoped there will be a full attendance.



HIGHEST AWARD:  
GOLD MEDAL.

Holzappel's Compositions Co., Limited,  
NEWCASTLE-ON-TYNE,  
Manufacturers and Sole Proprietors of  
**HOLZAPFEL'S**



International Exhibition  
CALCUTTA, 1884.

# INTERNATIONAL ANTIFOULING COMPOSITION

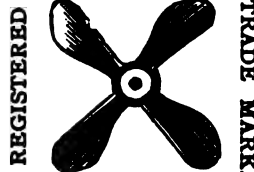
Colour and appearance same as "RAHTJEN'S PATENT" COMPOSITION, but the  
INTERNATIONAL is much **STRONGER** and more **EFFECTIVE**  
as an **ANTIFOULER**.

## HOLZAPFEL'S National Antifouling Composition,

Specially prepared for North Atlantic, Baltic, and Home Trades.

Contractors to—

The INDIAN GOVERNMENT.  
The AUSTRALIAN GOVERNMENTS.  
The IMPERIAL AUSTRIAN GOVERNMENT.  
The IMPERIAL TURKISH GOVERNMENT.



Contractors to—

The IMPERIAL RUSSIAN GOVERNMENT.  
The ROYAL DANISH GOVERNMENT.  
The CONGO FREE STATE (Yivi), &c., &c.

Contractors by Royal Decree to  
The ROYAL SPANISH GOVERNMENT.

## HOLZAPFEL'S *Patent Soapstone Composition,* THE MOST RELIABLE QUICK DRYING ANTICORROSIVE VARNISH PAINT.

MANUFACTURERS OF

## Genuine "Rahtjen's Patent" Composition,

Supplied at Considerably Reduced Prices. Warranted made according to Rahtjen's Original Specification.

MANUFACTURERS AND SOLE LICENCEES OF

## DANBY'S ANTICORROSIVE COMPOSITION,

Possesses exceptional qualities for adhering to Iron and Steel Surfaces and for Preventing Corrosion.

AGENCIES AT PRINCIPAL PORTS AT HOME AND ABROAD.

HIGHEST AWARD:  
SILVER MEDAL.

BRANCHES AT—

International Exhibition  
Crystal Palace, 1884.



CARDIFF - - 43, Mount Stuart Square.  
LIVERPOOL - - 3, Chapel Street.  
GLASGOW - - 12, Waterloo Street.  
LONDON - - 57, Fenchurch Street.



## REID'S NEW AUTOMATIC STEAM REDUCING VALVES

Are at Work from  $\frac{1}{4}$ -in. to 12-in., Reducing from 200 lb. to 5 lb.

**SIMPLE CONSTRUCTION. ACTION PERFECT.**



No matter how the **BOILER PRESSURE FLUCTUATES**, the **REDUCED PRESSURE DOES NOT VARY** from what the Valve is set for. Even if the initial Pressure drops below what the Valve is set for, whatever Steam Pressure is in the Boiler will be passed through the Valve.

**FULL BORE** Steam from Boiler, **HOWEVER LOW**, is **AT ONCE ADMITTED TO REDUCED SIDE**—for instance, if Valve set for 80 lb. on reduced side, any steam up to this pressure gets through, but nothing over.

Has no direct Spring over the Main Valve to cause reduction of pressure or "Wire-drawing," hence no necessity for larger outlet. **GUARANTEED NOT TO ACCUMULATE STEAM.**

Perfectly **AUTOMATIC** in its action; once set, it **REQUIRES NO FURTHER ALTERATION.**

## REID'S "VULCAN" AUTOMATIC SIGHT-FEED LUBRICATOR.

**Over 6000 in Use.**



*Best Lubricator for Land and Marine Engines, Triple, Quadruple, or otherwise.*

**EXTENSIVELY ADOPTED BY THE LEADING MARINE ENGINE BUILDERS IN THE UNITED KINGDOM.**

**NO MORE CUT SLIDE VALVE FACES.**

**SAVES 50 TO 75 PER CENT. IN OIL.**

**CYLINDER AND VALVES SUPPLIED WITH OIL REGULARLY.**

**REDUCES FRICTION BY CONSTANT AND REGULAR LUBRICATION.**

**WEAR AND TEAR REDUCED TO A MINIMUM.**

**REQUIRES NO ATTENTION. ONLY FILLING NOW AND AGAIN.**

**AUTOMATIC IN ITS WORKING.**

## SELF-LUBRICATING PULLEYS (McFARLANE & REID'S PATENT.)



For Ships' Cranes, Cargo Blocks, Mast Blocks, Boat Falls, Steering Gear, Stern Shafts, Mining Purposes, Wood-working Machinery, Railway Axle Bearings, Tramcar Bearings, Loose Pulleys, and Bearings of every description.

**WORKED over 50,000 TONS OF CARGO, and STILL AS GOOD AS NEW. WORKED over 2½ YEARS on the LOOSE PULLEY OF SAW BENCH, and YET AS GOOD AS NEW.**

### ADVANTAGES.

Immense Saving in Cost of Repairing Pins, &c. Spindles always Lubricated, and do not Cut or Wear. Less Friction, and the Pulley Runs Easier. **Pulley Pins LAST FOR YEARS.** Less Liability to Accident. Fits into Existing Frames. **Unexp—Costs about same as ordinary Sheaves.**

A Storekeeper writes:—"Been constantly in use for 12 Months, and pins practically no scratch on them."

## SPRING-COIL TUBE BRUSH. Lasts Six Times Longer than Ordinary Brushes.



### THE GREAT ADVANTAGE

of this Brush is **ELASTICITY**, and that, after being used, the **WIRES DO NOT BECOME BENT.** These Brushes are formed in such a way that each Wire is a **COIL**, as shown in illustration.

# WILLIAM REID & CO.,

112, Fenchurch St., London, E.C., & 1, Akenside Hill, Newcastle-on-Tyne.

# WORTHINGTON PUMPING ENGINE CO.

153, QUEEN VICTORIA STREET, LONDON, E.C.  
WORTHINGTON.

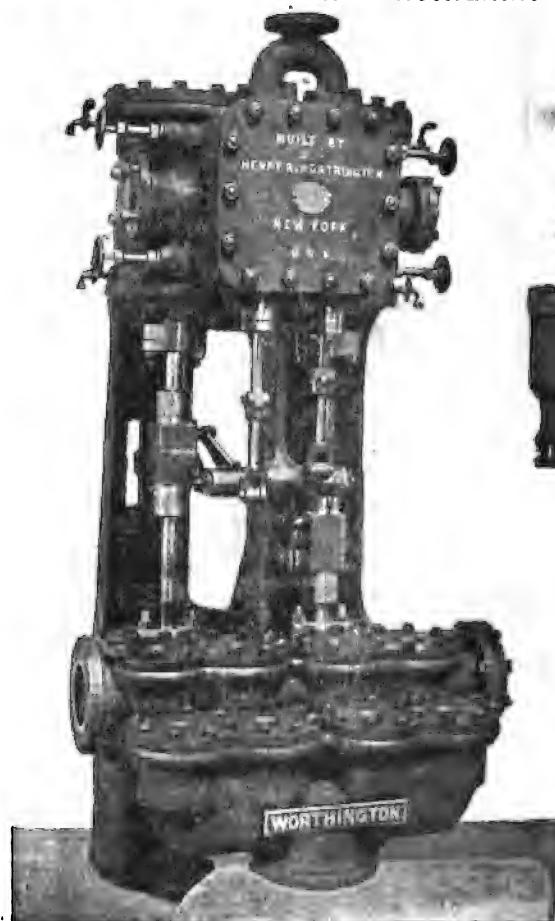
Telegrams:  
"TUNE HARP,"  
London.



Telephone  
No. 1614.

TRADE MARK.

## WORTHINGTON VERTICAL PUMPS, FOR MAIN AND AUXILIARY BOILER FEEDS AND GENERAL SERVICE.



New Style Vertical Marine Pump with Pot Valve Chambers.



Worthington Feed Water Heater for 10,000 Horse-power.

## WORTHINGTON FEED WATER HEATERS FOR MARINE OR LAND ENGINES.

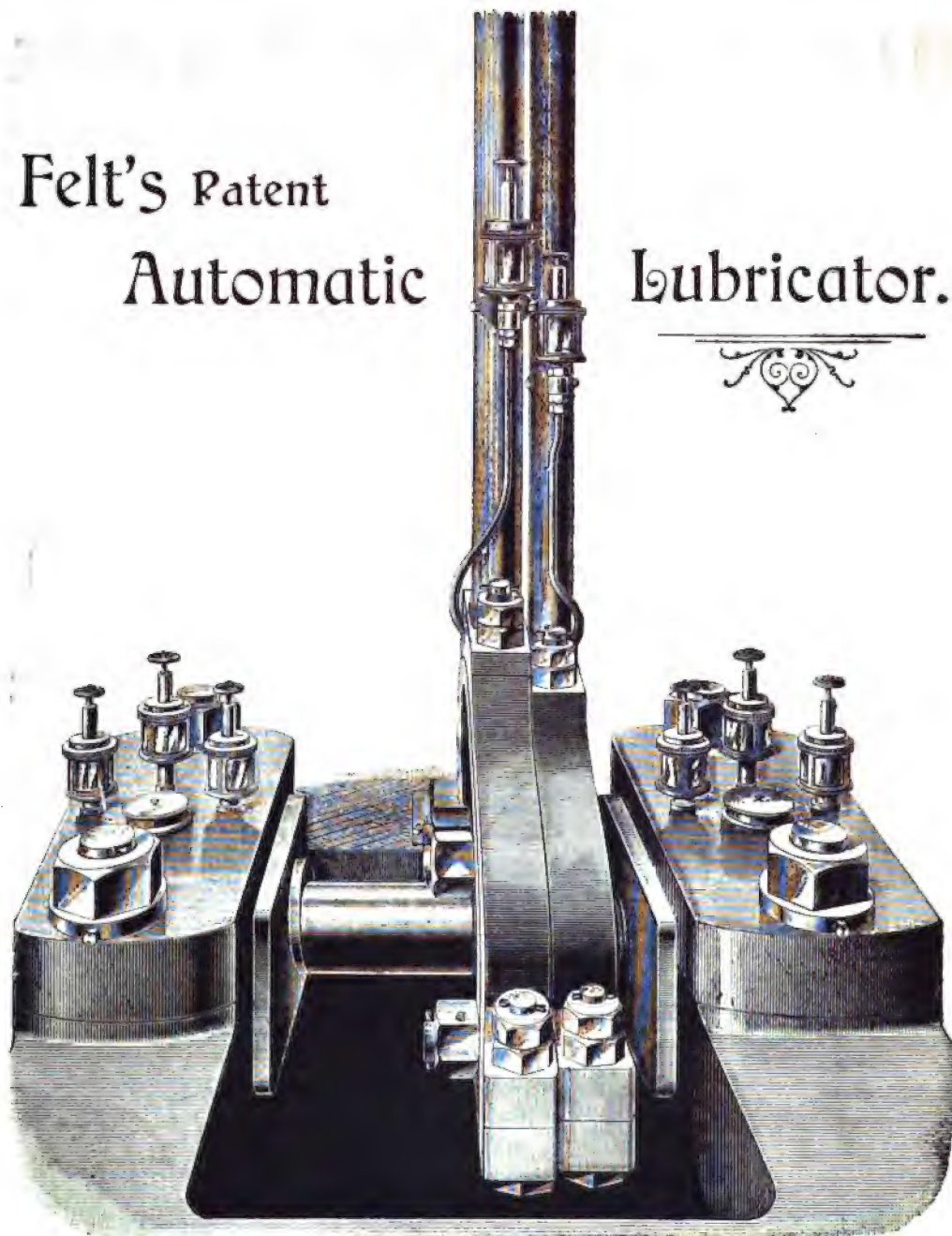
**WORTHINGTON PUMPS for EVERY SERVICE**  
WITH GUN-METAL OR IRON WATER-ENDS.

SEND FOR SPECIAL CATALOGUE..

PRICES AND ESTIMATES ON APPLICATION.



# Felt's Patent Automatic Lubricator.



From a Photograph showing its application to the Main Shaft Bearings (16 inches in diameter) and Eccentrics of Marine Engines.

The following are among some of the Advantages claimed for this new Lubricator and Lubricating Compound :

- 1.—The Container or Cup of the Lubricator being of glass, the displacement of the Lubricant and the position of the piston can at all times be seen, so that the Cup itself need never become empty through miscalculation.
- 2.—Giving a regulated continuous supply, and perfectly under control; friction thereby being greatly reduced.
- 3.—Automatic after starting, and not liable to get out of order. Feeding only when the machinery is in motion.
- 4.—Easy of adjustment to the requirements of different bearings.
- 5.—Can be fitted in any position, or made to communicate with distant bearings.
- 6.—The small quantity used as compared with oil—one pound of the Compound doing the work of one or two gallons of Lard, Olive, or Castor Oil.
- 7.—It does not run off the bearings, neither does it require them to become heated by friction before it lubricates like tallow and other compounds.
- 8.—It is perfectly free from acid, inodorous, and is not affected by water, heat, or cold.

FOR FURTHER PARTICULARS APPLY TO

**W. O. FELT & Co.,**

9 & 10, Southampton Street,  
High Holborn, LONDON, W.O.



# TUCK'S TRIPLE PACKING.

(MORISON'S PATENT.)

## THE ONLY RELIABLE PACKING FOR TRIPLE EXPANSION ENGINES

### READ THE FOLLOWING:

Messrs. TUCK & CO., Ltd., London.

Gentlemen,—I have much pleasure in testifying that I have used your Triple Expansion Packing in various steamers.

In the s.s. "Belle of Dunquerque," I had it put in at Cardiff in the H.P. piston rod and H.P. valve spindle; it ran three voyages to Spain and back, and we only once adjusted the glands. Twice we added one turn, and one turn of soft Tucks on top of neck ring. This packing ran from October, 1889, to October, 1890.

The Steamer being sold to Belgian owners, it was still retained in the stuffing boxes, and it was still good when I left, having conducted the vessel as far as Land's End, she proceeding to Congo. I am again using it, and can honestly say it is a most reliable packing.

Our pressure on both steamers was 160 lbs.

I am, Gentlemen,

Yours truly,

R. G. ERSKINE,

Chief Engineer s.s. "Tourcoing."

## TUCK & Co., LIMITED,

SOLE MANUFACTURERS OF THE ABOVE; ALSO OF

## TUCK'S GENUINE PACKING

TUCK'S PURE ASBESTOS, AND TUCK'S METALLIC PACKING,

India Rubber Goods of all Descriptions,

LEATHER BELTING, HOE, &c.

116, CANNON STREET, LONDON.

LIVERPOOL: 42, Chapel Street. | MANCHESTER: 35, Market Street. | CARDIFF: 103, Bute Docks. | NEWPORT: Alexandra Dock. | BARRY: Barry Dock. | SOUTHAMPTON: Richmond Place.

Also Branch Establishments at 13, Astons Quay, Dublin, and 13, King Street, Melbourne.

CONTRACTORS TO THE ADMIRALTY.

# PURE WATER.

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## LIPSCOMBE & CO.'S

### CELEBRATED

# CHARCOAL FILTERS

Superior to every Machine hitherto invented for

*EFFECTUALLY PURIFYING RAIN, POND, RIVER & SPRING WATER.*

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## SHIP'S FILTERS.

Glass Table Filters.

Syphon Filters.

Earthenware „

Pocket „

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*Slate Cisterns & Iron Tank Filters.*

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SHIPPERS ARE INVITED TO APPLY FOR SPECIAL TERMS.

**LIPSCOMBE & CO., 82, MARKET STREET,  
MANCHESTER.**

**WATER FILTER MANUFACTURERS**

TO HER MAJESTY AND THE ROYAL FAMILY.

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**A HIGH-CLASS ANTI-CORROSIVE  
LUBRICANT.**

---

**“ ENGELBERT'S  
LUBRICATOR,”**

FOR

**CYLINDERS AND VALVES,**

Our “SPECIAL” or “S” brand, highly recommended for Triple Expansion Engines.

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**CORROSION IMPOSSIBLE.**

Guaranteed not to “PIT” Marine Boilers.

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Cannot GUM or CLOG the Machinery.

Specially suitable for **MARINE ENGINES** because it has no Corrosive Action on Boiler Plates  
and prevents “Scale” in Boilers when used in Engines having Surface Condensers.

*PRESERVES THE INDIA-RUBBER VALVES.*

---

Leaves no deposit in Boilers or Condenser Tubes.

---

E.O.

**Our New Pale Compound**

E.O.

**ENGINE OIL,**

**FOR THE GENERAL LUBRICATION OF MARINE ENGINES,**

At **1s. 6d.** per gallon for 3 casks and upwards.

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*Prices, Particulars, and Samples on Application to the Sole Manufacturers—*

**ENGELBERT & Co.,**

**44 TO 47, BISHOPSGATE STREET, LONDON.**

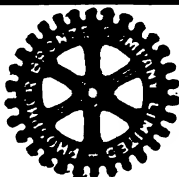
# THE PHOSPHOR BRONZE CO.,

LIMITED,

*87, Sumner Street, Southwark, London, S.E.*

FOUNDERS AND SPECIALISTS IN METALLIC ALLOYS.

SOLE MAKERS OF THE  
"VULCAN"



"COG WHEEL" AND  
BRANDS OF GENUINE

## "PHOSPHOR BRONZE"

*The best and most durable Alloys for Bearings, Bushes, and parts of Machinery exposed to friction and wear.  
Unrivalled in durability and in uniformity of excellence.*

## ROLLED PHOSPHOR BRONZE

Has the strength of mild Steel, resisting corrosion better  
than any Copper Alloy.

*SHEETS FOR VALVES, ECCENTRIC STRAP LINERS, SPRINGS, &c.*

BARS FOR PUMP & PISTON RODS, VALVE  
SPINDLES, STUDS, BOLTS, NUTS, &c.

## BULL'S



## METALS.

**PROPELLERS & OTHER CASTINGS, FORGINGS, RODS, SHEETS.**

*Malleable as Wrought Iron, Stronger than Mild Steel, Non-Corrosive as Gun Metal.*

*BABBITT'S METAL, "VULCAN" BRAND, in 5 Qualities; PLASTIC METAL, "COG WHEEL" BRAND; WHITE BRASS, No. I and II.*

## PHOSPHOR TIN AND PHOSPHOR COPPER,

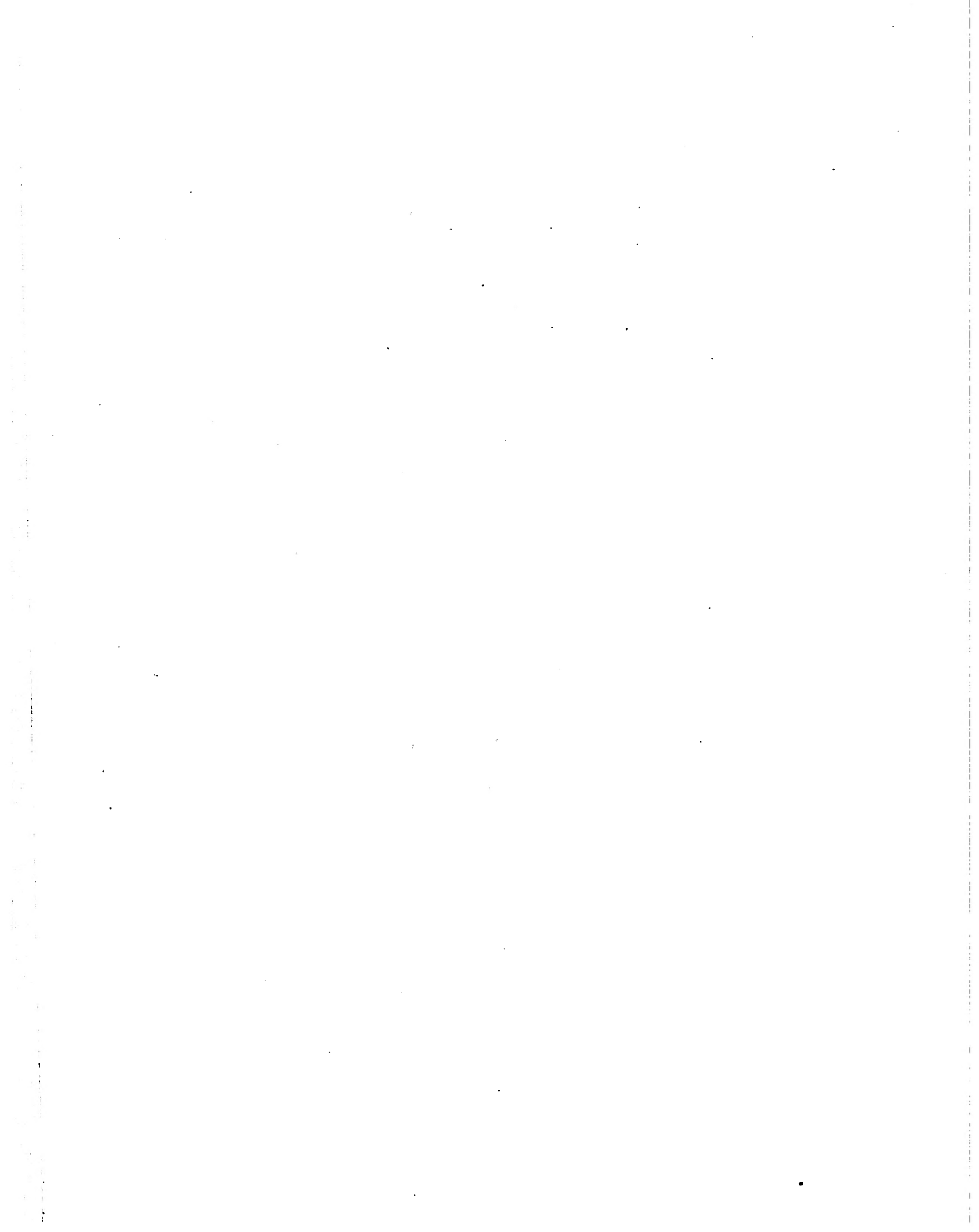
"COG WHEEL" BRAND.

Please specify the Manufacture of THE PHOSPHOR BRONZE Co., Ltd., and write for Catalogue.











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